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ABSTRACT

A guide for educators seeking to reform programs and teaching methods at established medical schools is presented. Focused on practical problems, attention is directed to an innovative curricular track and the ideas, experiences, and discussions presented during a conference attended by educators at eight institutions that have used the track approach. The institutions, which are located in China, Mexico, the Philippines, Thailand, and the United States, have used the track approach to reform medical education to be more relevant to the health needs of given populations by using either problem-based or community-based learning in the educational process. Of concern are 23 strategies for using the track approach to implement change, with consideration of start-up, building support and overcoming resistance, evaluation, networking, and options for the future of the track. Features and experiences of the innovative track schools on seven points are compared, including motivation for seeking change, curriculum content, and policies governing admissions. Comparative information is summarized in an extensive table that illustrates common trends and differences in approaches, circumstances, or outcomes. Detailed case studies of the eight schools are also presented. (SW)

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An experimental approach to change relevant to health needs

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WORLD HEALTH ORGANIZATION, GENEVA

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Foreword—World Health Organization

The World Health Organization (WHO) is an intergovernmental organization with, at present, 166 Member States. Its constitutional objective is "the attainment by all peoples of the highest possible level of health" (*1*) and its supreme governing body, the World Health Assembly, resolved in May 1977 that "the main social target of governments and WHO in the coming decades should be the attainment by all citizens of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life" (*2*). This is popularly known as "Health for All" (HFA). Then, in 1978, the Alma Ata Conference on Primary Health Care (PHC) declared PHC to be the key to the achievement of HFA.

WHO is thus deeply concerned with the problems of "health", but what does it have to do with "education"? It is clear that the optimal use of the right kind of trained personnel is a most important component in the fight for health, and thus in the movement for HFA. Hence the Organization's long-standing interest in human resources development in general and especially in education and training of health personnel. For a long time the major emphasis of this programme was on promoting the production of more health personnel, especially of physicians. However, time has shown that although this drive for quantity has been successful, and in some cases even too successful leading to overproduction of certain categories of health personnel, the relevance of the personnel trained to the health needs and demands of the population has often been far from satisfactory. The emphasis of the programme has therefore slowly shifted (*3*) to the promotion of improved training of health workers to ensure the increased relevance of such training to national health priorities, that is to say to HFA through PHC.

There are relatively few training institutions where there is a clearly demonstrated concern with this aspect of "quality" of the training programme, or where it is well understood that "one is excellent only if one is relevant" and that "the highest standard in medical education for any country is that which is most responsive to local need" (*4*). Yet these few institutions, whose main characteristic is that their training programmes are community-oriented and use the community, in addition to hospitals, as a major learning environment, were convened by WHO to a meeting in 1979. They decided to form a Network of Community-Oriented Educational Institutions for Health Sciences. The Network has since grown in strength and number. But just as the founding members were all newly established institutions, those which have since joined

are also mostly new. Institutions with conventional training programmes seem to find it most difficult to move away from the well-known hospital-based, exclusively patient-oriented pattern. The notable exceptions, which so far only seem to reinforce the rule, are those institutions, a mere handful, which decided to allow the development of an additional, alternative programme. These are called "experimental", "parallel", or "alternative" "tracks" and often serve as a community-oriented "option" within the framework of an otherwise traditional institution. These "tracks" thus represent the hope for change of these older, established institutions in the direction of relevance to HFA through PHC.

WHO looks on these "tracks" as representing the germs of the future which, if they do well in fertile ground, can grow, blossom, and bear fruit not only in the form of graduates who are able and willing to serve society according to its needs, but also by influencing their institutional environment towards change.

The writer has had the privilege of visiting several of these "track" programmes and is convinced that at present this is the best, if not the only way, to promote change in established institutions towards HFA through PHC. There is clearly a need to make these programmes and their valuable experiences widely known and so help others who want to change to get started, avoid pitfalls and proceed more safely and rapidly. Hence the idea of a conference attended by such schools and of a publication of their pooled wisdom was attractive. This report, by sincerely analyzing experiences, successes and less successful approaches, may provide not only the vitally necessary stimulus for change but also those most useful "hints" which will help those who decide to start moving on this so difficult path.

WHO will always be interested in stimulating change, and in collaborating with those who are involved in changing the education of health personnel to promote the relevance of graduates' service to Health for All through Primary Health Care.

Dr. T. Fulop
Director, Health Manpower Development
WHO/Geneva

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Foreword—Network

The "winds of change" are blowing in medical education. In various parts of the world, medical schools are experimenting with new ways to educate future physicians. Some of these experiments are well publicized from the outset; others have been going on quietly for many years not much fanfare, just steady, determined achievement. These adventures began in different ways: a clear-eyed vision by a tenacious dean; the product of a group of dissatisfied educators from a single institution; or a national mandate for change and experimentation.

In recent years, these risk-taking institutions have found each other, discovering a kindred spirit among themselves. This has led to discussions and associations where problems are presented, solutions are proposed, and results are reported. More importantly, these linkages have provided mutual support and encouragement, and have led to creative activities which might not have happened had the institutions remained isolated. A particularly powerful feature is the international nature of this movement, where each experiment, though rooted in a particular cultural setting, can nevertheless provide insights that are useful in other countries.

A fine example of all of this was the October 1986 Albuquerque meeting, described in this book. Medical educators from five different countries and eight institutions met around a common interest: the use of a "track strategy" to introduce new methods of educating physicians of the future. The format of the meeting reflected the style of innovation in these institutions. There were specific questions explored by small working groups. There was an unhesitating display of problems, mistakes and surprises. Creative solutions were suggested and by the end of the meeting, there was a clear sense by both individuals and institutions that they were part of something bigger than their own program. They also saw that there was much more to do.

The Network of Community-Oriented Educational Institutions for Health Sciences was very pleased to be a sponsor of this meeting, since it contributed directly to the Network's objectives. These are to help those educational institutions determined to provide future health workers with training that is relevant to the health needs of a given population. This Network, founded in Jamaica in 1979, now has more than twenty full members, with many more associate members and correspondents. Its activities, coordinated through a secretariat in Maastricht, Holland, include communications, exchange of teachers and students, special meetings and task forces.

One of these task forces (Task Force 7, on "Program Evaluation") is based at the University of New Mexico.

This university has fostered one of the most important medical education experiments in the United States in the past ten years. It is fitting that this group of adventurers has been charged by the Network to lead its efforts in program evaluation, since the New Mexico experience itself demonstrates this activity. From the outset of the Primary Care Curriculum adventure, questions have been posed about this educational intervention, data obtained, and modifications made based on this systematic analysis. This new knowledge about medical education has been published, and is available to the world-wide medical education community. Not adequately captured in these publications is the spirit of adventure, self-criticism and colleagueship which pervades the New Mexico curriculum. The message for both teachers and students seems to be, "medical education can be fun".

This balance of science and enjoyment also characterized the Albuquerque meeting. These proceedings of that meeting, through case studies and summaries, highlight some important general principles of academic planning. They are applicable to more than just the "track strategy" in medical education. They will be useful to any individual or institution interested in new approaches to the education of health professionals.

Vic Neufeld, M.D.
Associate Dean (Education)
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Chairman,
Network Executive Committee

Preface

"By the end of the Albuquerque Conference, I no longer felt like a Mexican. I felt more like a citizen of the world."

Pablo Moreno Silva, National Autonomous University of Mexico

The world of medical education urgently needs more effective approaches to change.

Medical education is facing global criticism for two primary reasons. First, it lacks relevance to the tasks to be performed in primary health care systems. As a consequence such education fosters a maldistribution of its graduates by geography and specialty. Second, the explosion of scientific information makes traditional curricula increasingly irrelevant, because they are based solely on what is known today, to the exclusion of how to learn what will be known tomorrow. Educational reform is desperately needed.

And yet, only 1.5 percent of medical schools have adopted innovative programs which address these issues. These schools, which are mostly new ones, have introduced radically different learning methods in community-oriented learning and in problem-based education the results of which are proving to be very effective.

However, these results have not yet had a substantial influence on the 98.5% of medical schools which adhere to the traditional programme as well as methods of teaching.

One basic reason for this may be that the innovative schools have failed to provide a clear road map leading to change. Such a map must not only show the goals to be reached, but it must also delineate the many obstacles along the way, and the most efficient paths to follow.

A conference was convened in Albuquerque, New Mexico, in October 1986, in order to produce such a map. This book is the result.

*
* *

The Albuquerque Conference was sponsored by the Network of Community Oriented Educational Institutions for the Health Sciences, initiated and supported by the World Health Organization and hosted by the University of New Mexico School of Medicine. It was attended by representatives of eight innovative health science

institutions from China, Mexico, the Philippines, Thailand, and the United States. Each of these institutions has addressed the above problems in medical education in one specific way: by establishing an innovative curricular track. It is a curriculum distinct from, but running parallel with, the already existing curriculum. Although each group of innovators faced different problems and obstacles, each created needed change within its established, traditional institution by using the same strategy.

Introduction

Significance

The problem of maldistribution of physicians by geography and specialty is a consequence of such factors as emphasizing learning in urban, tertiary-care hospitals, and selecting teachers who are predominantly subspecialists. One educator noted these consequences:

> "Doctors find themselves unaccustomed to assess and evaluate the health care needs and priorities of their own country and its people. They are incapable of providing or implementing preventive programs. They are unprepared to work in the slums of the cities or to manage a rural health care team." (*1*)

This sentiment was forcefully expressed in the World Health Organization's Conference in Alma-Ata (1978) which confirmed the goal of "Health For All By The Year 2000." (*2*)

The information explosion, particularly as it pertains to medical science, has led to calls for education reform: utilizing problem-solving rather than rote memory, stressing active rather than passive learning, and emphasizing student-centered rather than teacher-centered education. These are recommendations in the Association of American Medical Colleges' report on "Physicians for the Twenty-First Century." (*3*)

But why haven't established health science institutions responded to these calls for change? The basic reason is that they are steeped in tradition, jealously guarding departmental power bases and the status quo against newer, "alien" ideas. There is little incentive to change. While experimentation is encouraged by traditional institutions in the laboratory or clinic, it is often resisted in the school itself. Faculty members who would like to initiate changes in such institutions find themselves facing what seems to be an impenetrable wall of resistance. They need assistance in breaking through that wall.

Educators who are contemplating change in traditional schools can greatly benefit from careful analysis of strategies employed by schools that have succeeded in bringing about fundamental curricular change. They can select appropriate strategies and adapt and apply them to their own institutions.

The World Health Organization financially supported a conference of schools that have attempted such change. The Albuquerque Conference pooled the experiences of eight established health science institutions from around the world; institutions in

which the walls of resistance had been breached. It is the hope of the conference planners that readers of this volume will absorb from its pages some of what the conference participants learned from one another. Each program faced a different set of institutional problems and constraints, as well as a different community environment. Each had to make different choices in order to survive and thrive on its home turf. But despite these differences, they shared a common strategy in attempting to create change in their established, traditional institution: each introduced a separate, innovative curricular track aimed at greater relevance to health needs. WHO gave financial support to the conference because it believes such separate tracks are a means to introduce into the curricula, in a relevant way, the health needs of the population.

The schools participating in the meeting are given below, in chronologic order of the years in which students were first admitted to their tracks:

The National Autonomous University of Mexico's General Integrated Medical Program (PMGI, or A-36 Track). Mexico (1974)

Michigan State University's Upper Peninsula Medical Education Program, (UPMEP). USA (1974)

The University of the Philippines' Institute for Health Sciences -Palo, Leyte program (UP-IHS). Philippines (1976)

Chulalongkorn University's Medical Education for Students from Rural Areas Project (MESRAP). Thailand (1978)

The University of New Mexico's Primary Care Curriculum (PCC). USA (1979)

Rush Medical School's Alternative Curriculum. USA (1984)

Harvard Medical School's New Pathway. USA (1985)

The Shanghai Second Medical University's Problem-Based Curriculum. China (1987)

Each of these institutions sent two to four representatives to the conference. For four days participants shared their experiences, research outcomes, successes, and failures in order to produce a document which would serve as a practical guide for other health science institutions contemplating such a strategy.

Why select an innovative track as a vehicle for these changes?

Conference participants described seven important reasons why an innovative track can be successfully employed as an agent of change:

1. It minimizes threat

An innovative track allows a small group of committed faculty members and students to try out new types of curricula and new educational methods without initially forcing the rest of the faculty either to change what and how they teach or to participate in the innovation.

2. It bypasses departmental control

The track brings together educators, from different departments, who place students' educational needs above departmental concerns. The goal of offering an integrated curriculum can be undermined by traditional departmental control of curriculum and evaluation.

3. It provides a protected environment

A track allows room for ideas to be tested by participating faculty and students who are drawn to the innovation. The educational concepts devised by planners of the innovation need to be tried out and modified until it becomes clear which ones are workable and which are not. Innovators need time and space to develop and modify new approaches.

4. It allows extensive student involvement in the community

A track offers planners an opportunity to build an entire curriculum de novo around priority health problems, and to include the community and a diversity of health services as important sites for learning. In contrast, the traditional medical student's week is filled with scheduled course hours on campus and in sophisticated university hospitals (*4*). Curricular content is designed by departments which compete for time, and which infrequently look beyond their own courses to the overall learning needs and future careers of students. Scant time is available for student exposure to health problems in the community, even though this is where virtually all health problems originate, and where most care is given.

5. It offers alternative approaches to learning

The innovative track, which is student-centered, is adapted to the diversity of students' learning styles. It gives them a larger responsibility in organizing their learning.

6. It provides an ethical approach to educational innovation

It is ethical to test an innovative program with a small group of volunteers, before it is mandated for all students.

7. It permits experimental comparison

An innovative track running alongside a traditional one within a single institution allows innovators to evaluate its effectiveness using students in the traditional track as controls.

Preparation for the conference

Each institution prepared a document which included a case study describing its program and a self-analysis of the development and outcome of the innovative track as a strategy for change. It is the belief of the conference planners that an in-depth evaluation of this strategy is of more value to educators in traditional medical schools than a simple description of each program.

To facilitate a cross-comparison between programs, each school was asked to address nine questions:

1. What are the principal characteristics of the innovative and traditional track programs in your school?
2. What were the rationale, motivation, and major incentives for initiating the innovative track?
3. How was the track initiated and organized at the outset?
4. What were the social, economic, and political forces supporting and resisting change?
5. What strategies were developed to overcome barriers to change and to develop support forces?
6. What were the roles of funding, legislative mandate, and leadership in the planning and development of the innovative track?
7. What were the roles of other institutions in helping to develop the innovative track?

8. To what degree has the innovative track influenced the conventional track, and vice versa?
9. What have been the program outcomes, and what are the desired future developments?

Responses to these questions facilitated comparison of program strategies and assured that sufficient attention was devoted to each element of change.

Finally, each school completed a questionnaire for inclusion in these proceedings. This provided numerous fine details about the program for comparative reference purposes.

Tasks of participants

The conference was conducted almost entirely in four small, problem-oriented group sessions, with representatives from different institutions. Topics discussed in the small groups focused on the key elements of the change process. Each group pooled its experiences and made recommendations about steps in bringing about change.

The task assigned to each participating school was to discuss, in the small-group format, their successes and failures; how they had corrected mistakes; and how they had learned from others. This was not only a difficult and complex assignment, but also an uncomfortable one for many of the participants. We are more comfortable presenting a favorable face to the world—describing our achievements. Describing our failures can be embarrassing, yet it is of inestimable value to other educators, since they can more easily identify with, and learn from, an open account of problems they themselves face. This is the basis for a road map to change.

Each group of participants at this conference had to contend with other problems as well. Not only were they writing about themselves, but also about their entire medical school and, at times, their universities. Each had to be politically sensitive to the broad audience which was reviewing their work "at home". They had to balance their enthusiasm for their achievements with a sober reflection on how the innovative track appeared to those not intimately involved in its creation, or in its existence. The fact that the participants were willing to reveal so much is a credit to their integrity, trust in others, and belief in themselves.

Learning from each other

Sharing ideas and problems with others around the world can be both comforting and enlightening. It can stimulate new approaches at one's home institution.

"I learned many useful strategies for dealing with problems which will arise while implementing an innovative program - how resistance to change can be handled, ways of evaluating an innovative program."
Zenaida C. Varona, University of the Philippines

"While leadership is important, I've learned it can also be an impediment if the leader is too rigidly wed to one approach, or if the innovation becomes too closely identified with one leader."
S. Scott Obenshain, University of New Mexico

"I was comforted by seeing similar problems elsewhere. Some are even in worse shape than we are, especially in shortcomings of evaluation, faculty opposition, and inadequate support outside the institution."
Charas Suwanwela, Chulalongkorn University, Thailand

"I was struck by several things: 1) the powerful commonalities of problems across schools and countries, 2) the importance of leadership in catalyzing change in complicated environments, and 3) clarification of my own thinking about evaluation."
Gordon Moore, Harvard University

"I learned from other track schools that have been in existence for many years, how a program moves from early survival to development. I realized the importance of evaluation methodology and how we might design a suitable model for our track. I also realized that problem-based learning is meaningful for all learners."
Li Xue-min, Shanghai Second Medical University

The names of conference participants and addresses of participating institutions are included at the front of the book to enable readers to make personal contact with them. We hope that such contacts will help to widen the circle of interchange and influence of this small sample of eight schools which are attempting curricular change by means of an innovative track.

Organization of this book

The purpose of this book is to inform educators about using the innovative track as a strategy for change. We wish to encourage others to consider employing suitable aspects of this strategy in their own settings.

Power structures, sources of support, and patterns of constraint vary so greatly among institutions, that it would have been impossible for the participants in the Albuquerque Conference to formulate universal recommendations for change. Instead, what they have learned has been distilled into a core set of strategies. It must be noted that not all strategies are suitable for all institutions.

Part I presents these strategies in a format roughly approximating to the sequence of change.

1. Getting started.
2. Building support, overcoming resistance.
3. Evaluation.
4. Networking.
5. Options for the future of the track.

Part II presents the results of the detailed questionnaire completed by each participating school. We compare institutions, noting common trends and glaring differences in approaches, circumstances, or outcomes. We also discuss factors that might explain the trends that emerge from the data.

Part III finally presents the case studies of the eight participating institutions. They are the core text of this book. They provide readers with clear insights into the evolution of eight different innovative tracks which are in various stages of development. Each case study is an attempt at honest, institutional reflection and self-analysis which we hope will encourage others to share their own histories.

The need for change in medical education toward increased relevance to health needs is both urgent and far-reaching The authors hope that when readers complete this book, they will take action will press for needed institutional change. If this book facilitates such action, the Albuquerque Conference will have fulfilled one of its key missions an effective networki g of strategies for timely change in medical education.

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Part I

Recommended Strategies for Implementing Change

Introduction

Numerous strategies for implementing change were identified during the Albuquerque Conference. Individual ideas began to coalesce into key recommendations. Despite varied local circumstances, there emerged a series of successful strategies for implementing changes in established, traditional institutions. These strategies are presented in this chapter, along with illustrative examples. An overview of the five areas of recommendation, along with 23 suggested strategies are listed in Fig. 1.

Fig. 1. Recommended strategies for implementing change

Getting started

1. Explore external motives for change
2. Explore internal motives for change
3. Select for appropriate leadership qualities
4. Obtain educational resources
5. Seek financial support
6. Don't plan for too long—begin!
7. Develop a widely acceptable admissions policy

Building support, overcoming resistance

1. Build broad-based support early
2. Avoid isolation
3. Compromise (but not on principles)
4. Develop faculty support through interactions with students
5. Develop student evaluation methods that are widely accepted
6. Describe the innovative track as an "Experiment"

Evaluation

1. Evaluate short-term results
2. Evaluate long-term results
3. Evaluate the "process" of change

Networking

1. Establish linkages between institutions in developing and industrialized countries
2. Develop linkages between similar, established institutions
3. Develop a "sister school" relationship
4. Affiliate with a larger, recognized organization or network

Options for the future of the track

1. Maintain the innovative track
2. Combine the two tracks into a hybrid
3. Convert the entire curriculum to the innovative method

Getting started

Strategy 1: Explore external motives for change

It is important to explore the broader context in which motives for change exist outside the institution. For a change to achieve broad support it must appear relevant to an audience wider than the small group planning the innovative track. In fact, the innovation should, in its own way, address society's pressing health needs. Innovators should seek to link their innovation with important forces outside the institution, forces which are also seeking change.

Examples: 1) The governments of Thailand and Mexico, as well as the World Health Organization, have determined that an overproduction of medical doctors, and neglect of primary-care training, are detrimental to achieving basic, acceptable primary health care for all people. The innovative, community-oriented tracks at the Chulalongkorn University in Thailand and at the National Autonomous University of Mexico draw support from their national governments because these innovations fulfill a national need.

2) Medical educators at the Shanghai Second Medical University were dismayed by their students' lack of independent thinking and their passive behavior. The educators developed an experimental, problem-based curricular track to address this problem. At that time China was undergoing a sweeping modernization which included reform at all levels of education. There was, at the local and national levels, encouragement of local educational reform initiatives. Shanghai's experimental track was thus able to gain very broad-based support, and national recognition.

Strategy 2: Explore internal motives for change

It is critical for track planners to seek within the institution a broad base of support. All institutions feel some need for educational improvement. But the degree of this need, and its constituency, vary with the times and the local environment. Track innovators should identify and tap into this undercurrent of potential support. They can broaden the number of educational issues addressed by the innovation, choosing those which appeal to a wider audience.

Examples: 1) The University of New Mexico's program focused initially on producing an increasing number of graduates seeking

primary-care careers in underserved areas. Problem-based learning was one vehicle employed to prepare the students. Other educators in the institution were desirous of producing graduates who, regardless of career goals, were more scientific thinkers than those that were being produced by the traditional teaching methods. Track planners therefore widened their emphasis on exploring innovations in problem-based learning, and offered this new teaching method as a vehicle for achieving the goals of their colleagues. This substantially increased the attractiveness of the program for other educators and drew them into the support base.

2) Michigan State University's Upper Peninsula program was initiated to address the problem of physician shortage in the State's northern rural communities. The development of its problem-based curriculum, however, served a broader need on the main campus. It provided curriculum materials for an alternative, problem-based learning track running alongside the traditional curriculum. Therefore, greater support for the Upper Peninsula program was drawn from the main campus than would otherwise have been the case.

Strategy 3: Select for appropriate leadership qualities

The following aspects of leadership were found to be the most important to the successful institution of innovative tracks:

The ability to:

1) influence others (charisma).
2) be both credible and convincing to a broad institutional audience.
3) be an advocate who believes strongly in the innovation.
4) be a risk-taker with considerable self-assurance.
5) be flexible and able to compromise.

Those who generate the initial ideas for the curricular innovation are not necessarily those most capable of leading a successful effort at translating those ideas into a program acceptable to the institution. Leadership may emerge from various levels in the institution – dean, senior or junior faculty, or students. Innovators must identify and recruit leaders who can successfully promote the innovative program inside and outside the institution.

Example: The Deans or Vice Presidents at Michigan State University, the University of the Philippines, Harvard, and Shanghai

Second Medical University took very strong leadership roles in promoting their respective innovative tracks. Each leader was exposed to a personal risk by supporting a curriculum so alien to tradition. But each was successful by virtue of his ability to generate enthusiasm for the innovative track. These leadership skills enabled each of them to convince resistant faculty leaders to participate in the planning of the new track. In this way, the fledgling track was identified with respected faculty, and a sense of "ownership" was generated among them.

Strategy 4: Obtain educational resources

Obtain sample case problems, curricular syllabuses, and learning resources from other innovative schools. Review, revise, and adapt these to your own program goals and curricular needs.

It is enormously costly in faculty and staff time to create curriculum and resource materials de novo. Initially, time is better spent preparing faculty to facilitate student learning using the innovative methodology. The success of the innovation is more dependent on the quality of teacher-student interaction than on the specific curriculum materials as long as these are easily available to students. Further, the most creative ideas about how to revise case problems come after students have worked with the materials. It is very hard for innovative-track planners to predict beforehand how well particular problems will suit specific program objectives.

Example: The two oldest innovative tracks (both of which admitted their first students in 1974), at the National Autonomous University of Mexico and at Michigan State University, were introduced before there were other models to emulate. Curriculum development in both institutions was a Herculean task.

The more recently established programs at New Mexico (1979), Rush (1984), and Harvard (1985), had the benefit of a review of curriculum materials from earlier programs, as well as from totally problem-based schools like McMaster. This enabled the process of adapting materials already in existence to be adopted, and so reduced start-up curriculum costs. Even so, new curriculum materials still underwent substantial revision, based on the reactions of the first classes of students.

Strategy 5: Seek financial support

All innovative tracks require special financial allocations because of the costs incurred in the development phase of any program. The source of such funding can be reallocation of existing institutional budgets, or external government or foundation grants.

Financial support for the track helps to validate the worth of the project, and encourages acceptance within the institution. For a traditional faculty who fear that there will be extra, uncompensated time-demands made by the innovative track, additional funding can allay some of this concern. In some cases, external funding can buy department participation, while in others it can buy time for the innovation to be sampled and accepted by traditional educators.

Examples: 1) The tracks at Rush, Shanghai, and Mexico began without external grant support, but with internal reallocation of funding. This provided a highly visible validation of the programs by top administration, which resulted in a broadening of acceptance among the faculty.

2) The programs at Michigan State, New Mexico and Harvard began with considerable private foundation and government support. With these funds, the programs were able to "buy" faculty participation from individual departments.

3) Over six to eight years from their initiation, programs in the Philippines and New Mexico, that had been externally funded, were able to prove their merit to a sufficient degree for the Universities themselves to assume financial responsibility for them.

Strategy 6: Don't plan for too long - Begin!

It is important for the innovative track to become a reality expeditiously. And it is important to note that the most efficient and creative program development takes place after students arrive, not before, when planning is done in a vacuum.

Numerous reservations, doubts, and questions concerning the innovative track are certain to emerge both within and outside the program. While thoughtful planning and broad-based input can relieve some anxiety, waiting too long can actually magnify doubts and paralyze decision-making. Having real, live students participating in the program focuses faculty and staff energy productively.

Example: Track planners at Michigan State, New Mexico, and Rush felt pressured to begin quickly in order to demonstrate the

worth of their innovative ideas. To help initiate their tracks, they even settled for very small class sizes (Rush, 8; New Mexico, 10; and Michigan State's Upper Peninsula, 10 in alternate years). In each case the curriculum was being developed as students arrived, but the mere fact that they started, precipitated the needed creative focus to plan further program developments and to recruit faculty.

Strategy 7: Develop a widely acceptable admissions policy

Criteria for selecting students into the innovative tracks vary with the goals of the programs. In order to facilitate acceptance of the innovative track by the institution as a whole, track planners should consider incorporating aspects of traditional admissions criteria.

Most tracks have found that they have had to compromise on original admissions plans to conform more closely to the admissions criteria of the institution. When the track is new, it is most vulnerable to external criticism and it desperately needs the acceptance of traditional educators who wield far greater power in the institution than do the innovators.

Example: Applicants from rural and underserved areas often have lower scores on entrance examinations than do applicants from urban communities. However, the likelihood of their returning to practice in rural or underserved areas is higher. The rural, primary-care-oriented Medical Education for Students from Rural Areas Project (MESRAP) program in Thailand, and New Mexico's Primary Care Curriculum initially selected students more on the basis of rural background than on more traditional academic criteria. However, when the students from rural areas performed poorly on standard basic science examinations in medical school, the innovative tracks were widely criticized by traditional educators within the institutions. To protect the innovations, both tracks responded by raising the academic criteria for admission to their programs.

Building support, overcoming resistance

Strategy 1: Build broad-based support early

It is critical that track planners build support from different departments within the institution and, where applicable, from different community and government constituencies.

Example: Planners of Michigan State University's Upper Peninsula Program attracted the attention of the state legislators by recruiting broad community support. This legislative interest, in turn, encouraged administrators of the University's main campus in East Lansing to support Upper Peninsula's innovative track. Further, early community involvement encouraged community physicians to serve as clinical faculty in the new program.

Strategy 2: Avoid isolation

There is a tendency on the part of core planners to remain too isolated from the rest of the institution. Often, the planners' intent is to unveil their innovation only after all the major problems have been ironed out. This can be a serious mistake. Isolating the program from the institution diminishes the ability of others to contribute productively to the innovative track, or to feel any sense of responsibility for the program. Track planners may even be characterized as arrogant or elitist, and their innovation may be resented, or even rejected, for reasons of personal affront rather than for any characteristics of the innovation itself.

Example: Track planners at the National Autonomous University of Mexico kept their program physically apart from traditional faculty in order to develop their community-based curriculum. They thereby generated resentment of their innovative track by many traditional educators. In addition, when they desired the assistance of traditional basic scientists to develop resource materials for their track students, the quality of that assistance was grossly inadequate. Since the basic scientists had not sufficiently grasped the goals or methods of the new track and had not been kept informed, the materials they developed were not relevant to its needs.

Strategy 3: Compromise (but not on principles)

In almost every criticism there is a kernel of truth or a sentiment that needs to be understood. While innovators should defend and protect the basic values underlying their new track, they should show flexibility in compromising on specific educational methods.

Innovators honor their critics and offer them ownership in the innovative track by taking their criticisms seriously and by modifying the track on the basis of this feedback. The innovation is usually strengthened by incorporating appropriate input of its

critics. Compromise must be understood as a willingness of the innovators to conform, to a degree, with the common goals of the institution. Unfortunately, many innovators confuse basic program values with specific educational methods. They hold rigidly to methods, such as maintaining a particular size of tutorial group, while sacrificing needed institutional support for more important and basic program values, such as ensuring that students have major control over their own learning.

Examples: 1) The Dean at Harvard desired that his plans for a problem-based, student-centered tutorial curriculum should also incorporate a seven-year continuum of experience from the second year of college through internship. Despite almost universal rejection of this aspect of his proposal by faculty and students alike, the Dean held so tenaciously to it that he almost lost support for the entire project over this one element of the program. When he finally did compromise on this point, plans for the innovative medical school portion of the proposal proceeded with little opposition.

2) The track planners at Michigan State's Upper Peninsula campus and New Mexico not only desired a problem-based, student-centered, community-oriented structure for their curriculum, but they also proposed a career-ladder approach to education. Track students would first become physician's assistants (PAs), work for a year as PAs, then return to the track to become physicians. But the national medical school accrediting body told New Mexico planners that their track would be in jeopardy if they "bastardized medical education with physician assistant training". And local physicians in the Upper Peninsula opposed the physician assistance training progression proposal to the point that they would have rejected the entire Upper Peninsula medical education program if that proposal were left in. The planners therefore abandoned the career ladder method, but maintained the basic values acceptable to the accreditors and physicians.

Strategy 4: Develop faculty support through interaction with students

Students' enthusiasm for learning is the most successful force for convincing faculty to participate in the innovative track.

There are many roles faculty can be asked to play in developing and running the new track. These roles include administration, preparation of curriculum materials, and evaluation. But none offers more immediate reward than working with students who are

enthusiastic about learning. Intellectual debates about the new learning method, and educational research data supporting its value, are not as convincing to skeptics as hands-on, personal experience with the students.

Example: The Shanghai program planners recruited faculty for their proposed problem-based track by encouraging small experiments within each department. Faculty would test the new curricular ideas by hands-on tutoring sessions with their own students, using case problems developed at Shanghai. It was a highly effective technique, and not only allayed fears about the new methods, but also built support for the innovative track.

Strategy 5: Develop student evaluation methods that are widely accepted

Virtually all innovative track planners have developed methods of student assessment which are uniquely suited to the innovative curriculum.

The new instruments usually assess skills utilized in such areas as clinical reasoning, problem-solving, interpersonal communication, and the quality of community-based educational experiences. These skills are more difficult to evaluate quantifiably than are the skills (primarily rote memory) usually evaluated by traditional, multiple-choice content examinations. Evaluations without "clean" numerical standards are often attacked by critics as being "soft"or "lacking in rigor". As a consequence, the value of the innovative program itself is often demeaned. For this reason, virtually all innovative tracks have adopted some traditional student-assessment instruments in order to win general faculty approval, and to satisfy the demand for more familiar, quantifiable assessment by many of their students.

Examples: 1) The Shanghai program will administer newly developed, problem-solving examinations to students in both tracks at the end of each course. However, they will also administer the same basic-science content examinations to each group. Thus they will offer change while preserving some tradition.

2) In addition to extensive, innovative, process assessments, the New Mexico program gives a comprehensive, multiple choice examination to its students every six months in their first two years of medical school. This examination is very much like the Part I examination of the National Board of Medical Examiners, but in

this case it is used by the students as a self-assessment tool. The results do not form a part of the students' permanent records. However, the addition of this self-assessment tool has not only quelled the concerns of many traditional educators who feel comfortable only with hard numbers, but it has also calmed the nervous students in the innovative track who want to find out "what we really know".

Strategy 6: Describe the innovative track as an "experiment"

Experimentation in medical education elevates a merely "expected" faculty service (education) to the level of a loftier and more highly rewarded academic endeavor (research).

In most medical schools, faculty give education a lower priority than research, grant-writing, and other income-generating activities like patient-care and consultation. All of the latter are generally felt to count more toward academic promotion. Asking faculty to divert more time and resources to education, therefore, may meet resistance. Thus, it is important to frame the innovation in terms that are inherently appealing to a broad faculty audience, and to promote the innovation in terms that are consistent with their values and the existing reward system. Referring to the innovation as an "experiment" can be of help in this regard.

In addition, an experiment leads to results, analysis, and presentation for critical review. Faculty are more likely to support the innovation if they feel that they retain ultimate control over its continuation. A plan to review results of the track at a later date can satisfy this need for experimentation, review, and control.

Examples: In most institutions with innovative tracks, the faculty approved the educational experiment for a finite trial period after which evaluation data on the program would be reviewed. At Rush it will be evaluated after six years, and Thailand's MESRAP program will be evaluated after twelve. In other schools, evaluation of the track came about during the course of institutional review. The innovative and traditional tracks at the National Autonomous University of Mexico underwent a comprehensive evaluation during the innovative track's twelfth year, and all Philippine medical education programs underwent assessment of their effectiveness during the Palo, Leyte, track program's tenth year. At New Mexico and Harvard, faculty did not set a specific time for review, but such a review was explicit in the original approval of each track. Provision

for external review has encouraged the innovative-track planners to collect and analyze data about their programs, thus generating important educational research.

Evaluation

Strategy 1: Evaluate short-term results

It is important for planners of the innovative track to establish a set of questions that can be answered within one or two years about the feasibility and effectiveness of the program.

Administrators are likely to make decisions about the ultimate fate of the innovative track and its role in the larger institution, within a few short years. Such momentous decisions are likely to occur before the track has had an opportunity to graduate students and to demonstrate the fulfillment of its goals and the worthiness of its curriculum. Thus, the planners must become attuned to the important questions that the institution is asking about the program in the short run. This information can be used to decide when evaluation data should be obtained and presented in order to influence decision making. Virtually all of the data in these situations fall in the category of short-term results such as the following: "How do students in each track perform on comparable, standardized examinations?" "What is the cost and benefit of running two educational tracks in one institution?" "What is the effect on other aspects of academic productivity when the faculty's teaching burden is increased?"

Example: In New Mexico, there was a perception among faculty and students in the traditional track, that students in the innovative track studied less and had an "easier time". One evaluator quickly designed a five-day time-motion study during which a sample of students from each track kept logs of all their academic activities. The study demonstrated that while students in the innovative track spent less time in class, they spent more time studying on their own, and used a far greater variety of study resources, than did students in the traditional program. The data was presented to the faculty curriculum committee and the basic science liaison committee for internal dissemination. Criticism of this aspect of the program was soon quelled.

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Strategy 2: Evaluate long-term results

Planners of the innovative track should establish a long-term evaluation team to design or select measures of how well the track fulfills its goals, and to describe the secondary and unforeseen effects of the track on the students and on the institution. The evaluation will require the collection of baseline data (for later comparison), periodic assessment of students, and both quantitative and qualitative measurements.

While establishing an innovative track, the attention of the planners is consumed by the day-to-day details of curriculum development, by program management, and by political skirmishes within the institution. Program evaluation is too often crowded out of the top priorities. In addition, the budget is rarely adequate to cover what planners feel is the reasonable expense of running a high-quality educational program. In this environment the additional funding required by an evaluation component will likewise take a lower priority. In some institutions with scarce resources, such funding may not exist at all. But the lack of a long-term evaluation plan, established from the track's inception, severely compromises the effect the track can later have both within the institution and upon the field of medical education.

Example: The National Autonomous University of Mexico designed a long-term evaluation of its innovative track. The evaluation was conducted over a 12-year period. Among other things, it compared graduate profiles and career decisions with student profiles at entry into medical school. It could therefore document which results could be attributed to the influence of the particular track. It was seen that the innovative track successfully influenced its students to select primary-care careers, which were most needed by Mexico. This carefully collected comparative data was critical in the university's decision, at the end of the 12 years, to 1) retain the track as its continuing experimental curriculum, and 2) to transfer aspects of the innovation into the entire traditional curriculum.

Strategy 3: Evaluate the "process" of change

It is important for program evaluators to document not only what changes occurred as a result of the innovative track, but how and why they occurred.

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One of the most important contributions for the field of medical education made by innovative-track schools, concerns the process of change. These schools, therefore, have a unique opportunity to share with other educators a rigorous analysis of the change process itself which strategies succeeded, which failed? The outcomes of the innovative tracks cannot be fully understood without a process analysis which explores such issues as the context in which change occurred, the forces which supported change, and the forces which opposed change.

Example: At New Mexico, since the inception of the innovative track, a medical sociologist has been retained as an external consultant to help evaluate the impact of the track on the institution the process of institutional change. One important insight this type of evaluation fed back to track planners was that the Dean and many chairmen placed greater value on the prestige that the innovation brought to the institution, rather than on any particular "p-value" result comparing students in each track. This decreased the intense pressure on planners to conduct quantitative studies. It redirected attention toward the less quantifiable but more important outcomes of 1) disseminating change within the school, 2) increasing the track's and school's visibility within the state, and 3) having the faculty serve as consultants to other schools around the world. This enhanced the program's image both within and outside the institution, and increased support of the program by the Dean and chairmen.

Networking

Strategy 1: establish linkages between institutions in developing and industrialized countries

It is important to develop institutional linkages between developing and industrialized countries. Refreshing insights emerge when health science institutions see how medical educators from very different backgrounds and cultures identify and solve pedagogic problems.

Innovative health science institutions in developing countries tend to have more fully developed community-based education programs than their counterparts in the industrialized countries. Conversely, innovative institutions in the industrialized countries often have better developed problem-based learning, and more advanced evaluation technologies. This situation presents an ideal opportunity

for international program collaboration and exchange. Each can profit from the other's more advanced expertise.

Example: A formal linkage between the National Autonomous University of Mexico's A-36 program and the University of New Mexico's PCC track was formulated by an official agreement of exchange signed by both deans. Subsequently, the programs exchanged educational techniques. A-36 used PCC's problem-based learning and their techniques for student assessment, while PCC revised and expanded its students' community-learning opportunities by developing elementary and secondary school-based clinics modeled on those used by A-36. Therefore, clear benefits accrued to both institutions.

Strategy 2: Develop linkages between similar, established institutions

It is important to develop linkages between similar, established institutions – one with, and one without, an innovative track. The transferability of innovation may be easier between schools whose environments, histories, and cultures resemble those of each other.

Medical educators often learn most from, and trust the experience of, fellow educators who have created innovations in institutions that are similar to their own, in terms of size, orientation, administrative structure, and political and social environments. Curricular resources and approaches, and political strategies for change, are often more easily transferable between such similar institutions.

Example: Michigan State University's Upper Peninsula program was one of the key models for the development of New Mexico's Primary Care Curriculum. Both schools were public institutions in large, rural states that were developing small, rural-oriented tracks, using a new educational technology – small-group, problem-based learning. New Mexico was able to adopt successful innovations which had been pioneered at Upper Peninsula; but with Upper Peninsula's advice, New Mexico was able to avoid several critical political and accreditation problems which Upper Peninsula had experienced.

Strategy 3: Develop a "sister school" relationship

Two schools can, over a long period of time, build a close, cooperative educational relationship. There can be an exchange of

faculty and trainees, an exchange of program ideas, and even a formal, signed declaration of cooperation between the administrative officers of the two schools.

Some of the most valuable consultations and interschool observations come over several years, after repeated visits by both faculty and students. Over time, each school more fully understands the focus for change, the personalities, and the value of innovations in the other school. Further, a relationship of trust develops which opens up more honest and productive channels of communication.

Example: The Shanghai Second Medical University and the University of New Mexico built a collaborative relationship over a four-year period, during which multiple exchange visits and hands-on workshops led to the Shanghai school developing China's first problem-based curricular track. The New Mexico school learned how to design a problem-based learning curriculum within traditional disciplines, preserving departmental administrative structure control over the innovation.

Strategy 4: Affiliate with a larger, recognized organization or network

A variety of national and regional health and education bodies can provide guidance and support to innovative programs.

Although many important, innovative ideas may be generated among a small group of faculty who may even have begun their own track, these faculty may be professionally isolated from other educational innovators. But without external recognition and support, their innovation is more vulnerable to extinction by isolation, exclusion, neglect, or active rejection by their established mother institution. Recognition of the importance of their work to the institution and to society can be enhanced when their efforts are publicly linked to a nationally or internationally recognized organization, or to a wider movement for change.

Example: The University of the Philippines Institute of Health Sciences program at Palo, Leyte, received needed national recognition and support only after the program was presented at several international forums, after its description was published in recognized international journals, and after it became a key participant in the WHO-supported Network of Community-Oriented Institutions for the Health Sciences.

Options for the future of the track

Strategy 1: Maintain the innovative track

A school might decide to retain the innovative track indefinitely as a "research and development" track. It would serve as a testing ground for new methods, while the more traditional curriculum would continue to evolve by adapting features of the innovative track.

The innovative track is also a vehicle for attracting external funding since it offers a ready-made laboratory for educational experimentation. Thus, the added cost of running two tracks is more than offset by the grant funds brought into the institution and the creative environment thereby introduced. Further, the existence of different tracks provides varied educational options for students with different learning styles.

Example: School-wide curriculum planners at the National Autonomous University of Mexico and at the University of New Mexico have decided that their institutions are best served by continuing an innovative, experimental track in the forseeable future. In both cases the more traditional track has incorporated several important aspects of the innovative track. Thus, each institution now features two evolving tracks.

Strategy 2: Combine the two tracks into a hybrid

After a trial period, institutions can create a single, "hybrid" track by combining the best of the innovative and traditional tracks. Some institutions feel that the cost of running two tracks is prohibitive. Thus, after a trial period and evaluation of the innovative track, the best features of both tracks could be wedded into one hybrid curriculum. This would have the added advantage of averting competition between tracks and bringing the creative energy of those faculty formerly "sequestered" in the innovative track back into service for all students.

Example: Michigan State University is now considering a hybrid track due, primarily, to cost considerations. Its planned features strongly resemble the more innovative Track II.

Strategy 3: Convert the entire curriculum to the innovative method

After a trial period, the innovative track can demonstrate its worth and encourage a total conversion of the institution. When enough is known about what curricular changes need to take place, one should act on this knowledge and attempt to convert the entire curriculum to the content and methods employed by the innovative track. This would allow the institution to focus on a unified change rather than to continue with the uncertainty and higher cost of either endlessly fostering curricular change or running two tracks.

Example: While no innovative track has yet converted an established, traditional curriculum entirely to its innovative methods, some planners of Harvard Medical School's New Pathway support the notion of converting the entire curriculum to the New Pathway method.

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Part II

Comparison between innovative track schools: analysis of the questionnaires

This section presents a cross-comparison of various characteristics of the innovative tracks of the eight schools represented at the Albuquerque Conference. Each school submitted answers to an extensive questionnaire which was designed to provide critical information regarding the design, methodology, and development of each track. Analysis of the data was facilitated by grouping the information into seven broad categories:

1. Getting started
2. Curriculum
3. Overcoming resistance
4. Admissions
5. Personnel
6. Programme evaluation
7. Outcome

Summaries of the responses are presented according to these categories, together with brief elaborations. The questions and responses are presented in tabular form at the end of the chapter.

This section thus presents a series of approaches to the various steps in initiating and developing an innovative track. Some approaches have been embraced universally by the eight schools, while others have been suitable only to certain of the schools according to varied local circumstances. Common trends and contrasting approaches emerge from a careful examination of the responses.

Which strategies would be most suited to the reader's institution? A review of the opportunities and constraints existing at each of the eight schools in the conference will help the reader to make this determination.

Getting started

- Major motivations for change in every school were an excess of passive learning and a lack of curricular integration of basic and clinical science (Item 7).

  Despite institutional orientation (whether toward research, tertiary care, primary care, or community health needs), each school strives to graduate a more active learner, a more scientific thinker. Therefore, integrated, student-centered, problem-based learning finds a broad supportive audience among medical educators.

- Five schools out of eight indicated that an additional major motivation for change was the scarcity of primary care physicians in their geographic areas (Items 7, 14).

  Deficiencies in the delivery of health services and in the preparation of physicians for the tasks they are expected to perform in those services appear to be a primary concern of most public medical schools in developing countries and also in industrialized countries. This reflects the higher degree of accountability which is felt by state-run institutions toward the community. Private institutions have looser ties with the community and are more likely to make educational decisions on the basis of considerations within the institution.
- For six of the schools the track provided an opportunity to educate students also in the community (Item 13).

  In established programs, curriculum time is already "spoken for". The student's day is overscheduled with lectures, laboratory exercises, or hospital assignments. In such an environment, even if one could insert a few hours of community-based instruction, the course would probably be offered only as an elective, and would have little impact on student attitudes toward patient care or career decisions. With an innovative track, on the other hand, planners can reorder curriculum priorities. Community health care needs, for example, can be given prime focus.
- Seven schools felt that one of the important benefits of a second track was that the students had a choice between curricular options (Item 12).

  Different students prefer different learning methods. No one learning environment is appropriate for all learners. Thus, the addition of an innovative track gives each student the opportunity to choose, from two options, the learning method that is better tailored to his or her individual needs.
- Most participating schools required an average of two years from the initiation of planning to the admission of the first class (Item 1).

  Two years seemed necessary to plan the program, generate institutional endorsement, obtain funding, select and train faculty, develop the curriculum, generate learning materials, and secure learning sites.

- Every school reported that the innovative track was shepherded into realization by a charismatic leader – usually the President, the Dean, or a key faculty member (Item 3).

  Change of great magnitude in an established school requires a leader capable of taking risks – one who possesses powers of persuasion and a significant degree of self-confidence. These are essential qualities if one is successfully to challenge the status quo. Such a leader must have considerable charisma to rally support from a sufficient number of faculty and staff to provide adequate manpower for the innovation. These leadership skills must also be mobilized to protect the experiment and to blunt destructive criticism of the innovative track during its early, vulnerable years.
- All schools used the technique of small, multidisciplinary planning groups to develop their innovative tracks (Item 4).

  Introducing a new curriculum requires a high degree of commitment from different constituencies within the medical school community. When representatives from these constituencies are drawn into a small planning group for the innovative track, each representative can help shape the program, thereby investing in its ultimate success. As a consequence, these representatives bring to their constituencies proxy ownership of the innovative track. This sense of ownership generates support.
- Initial funding for the new track came from external sources in five schools and from a reallocation of internal funds in three (Item 5, 6).

  The establishment of an innovative track creates an added financial demand on the institution. However, the degree and source of funding for the innovations vary enormously from one institution to another. These differences may reflect variations in the degree of institutional commitment to the new idea, the existing resources of the institution, and the perceived usefulness of the innovative track in the achievement of institutional goals.

Curriculum

- Every school integrated basic and clinical science in preclinical years as a major feature of the innovative track. A hands-on, community experience was a frequent vehicle for this

integration. And for most schools, the problem-based format was of prime importance beginning, again, in the preclinical years (Item 40).

It is noteworthy that virtually all of the innovations are introduced to the students in the initial years of medical school. It is during the students' early, more "impressionable" years that planners of the innovative tracks feel that they can best establish an orientation toward program goals which will endure throughout the professional years.

- All of the innovative tracks employ tutorial groups. The tracks exhibit a wide variation in number of students per tutorial (5 to 25), number of tutorial meetings per week (2 to 5), and the length of time that each tutorial group stays together (5 weeks to 4 years) (Items 42, 44, 51, 52, 55).

  Important learning criteria are the opportunities to reason and think, to be stimulated by the learning environment, and to build a close relationship with faculty role models.

- All five innovative tracks with a community emphasis introduced the community component of their curricula in their students' first year, and prepared their students for this experience with training in clinical skills. Students thus provided useful community service during their learning experience (Items 45, 46, 47).

  While problem-based learning tends to rely on simulated clinical problems, community-based learning carries problem-based learning a step further. It places students in confrontation with real-life health problems, while providing them with sufficient professional tools to reinforce scientific learning with meaningful health care.

Overcoming resistance

Common sources of resistance

- The innovative track was perceived as an institutional threat by some faculty members in each of the schools. Common fears included a challenge to the departmental structure, an increased teaching load, and being asked to teach outside one's area of expertise (Items 19, 20, 21).

  The benefit to track planners of being able to control their own innovation was often a double-edged sword. Such freedom

generated fear among traditional educators, fear of a curricular force which was outside the purview of established departments and committees. The smaller the number of track planners,the larger was the number of "excluded" faculty members subject to these fears of the unknown.

- All schools developed new student evaluation tools deemed more suitable for their innovative tracks. These included such approaches as problem-solving exercises and self- and peer-evaluation. These less traditional methods often met with disapproval by traditional faculty (Items 25, 75, 77, 78).

  Traditional faculty members are usually more comfortable with evaluation instruments which produce easily quantifiable results like standard multiple-choice tests. "Rigor", for these faculty members, is linked with that which is quantifiable; the more impressionistic and subjective the evaluation, the more it is characterized as "soft". Behind such discomfort with newer evaluation approaches, lurks a fear of loss of control over the educational process itself. What and how you evaluate determines the shape of the curriculum and what students will come to value.

Common strategies to overcome resistance

- All schools found that a willingness to accept criticism, and to modify their innovative tracks accordingly, helped to build institutional support (Items 34, 35).

  A willingness to compromise on all but principles is an essential strategy for overcoming resistance. Critics are honored by track planners when their input is considered seriously. Critics gain important ownership over the program when their ideas are incorporated into the new track. Such openness on the part of track planners also softens a common criticism of any small, enthusiastic group that promotes change in a traditional establishment—that they are arrogant or elitist.
- In seven schools, faculty members who teach in the innovative track teach also in the traditional one (Items 36, 38).

  This dual teaching responsibility diminishes the potential for a destructive isolation of the two tracks, and facilitates a cross-fertilization of ideas. Furthermore, students in both tracks have access to the same educators, obviating an often-expressed fear

that the innovative track will deprive the traditional program of its best teachers.

- Most schools generated external financial support for their innovative track as a strategy to overcome local resistance. The support came from private funding agencies, the government, or from communities to be served by the track (Items 4, 5, 6, 27, 28, 29).

  External support for the innovative track is a signal to the institution that the new idea has validity and a receptive audience beyond the small group of individuals promoting the track at home. When such external support is forthcoming, it also signifies the timeliness of the innovation.

- Four schools encouraged broad faculty participation in the innovation by channeling funds to individual medical school departments (Item 31).

  The amount of the funds for participating departments is often small but it symbolizes recognition by track planners that they value educational efforts highly. This contrasts with a view held by many faculty that their educational efforts in the traditional system are not rewarded. In some cases the extra financial support helps departments cope better with budgetary constraints.

- All schools found that active involvement between faculty new to the innovation, and students in the innovative track, was a valuable recruiting tool (Items 36, 38).

  Students in innovative tracks usually manifest an enthusiasm for learning and an interest in close relationships with their faculty. This is usually attractive to traditional educators who have become resigned to a social and professional distance between themselves and their students.

- In seven schools the track planners referred to their innovation as an "experiment" (Item 37).

  This strategy is important. Medical "education" per se is felt by many faculty to be an obligation and a chore. Establishing the track as an "experiment," however, elevates it to a more highly rewarded and valued faculty endeavor — research. It also implies that the innovation will be scientifically evaluated and that a decision on its ultimate fate will be determined on the basis of hard facts. Traditional faculty feel much happier with this approach.

Admissions

- Five schools accept applications to their innovative tracks only from students already admitted to medical school. Three schools, however, admit students from the applicant pool directly into their innovative track (Item 60).

  Most innovative tracks find that by accepting applications only from students already admitted to medical school, they can avert the criticism that the innovation is "lowering standards" by accepting weaker students from the wide pool of applicants. Further, screening only already-admitted students for the innovative track allows more attention to be devoted to assessing each student's degree of motivation, sense of responsibility, and adaptability. These are important ingredients for success in the new learning environments. Each of the three tracks that accept applicants directly was established to redress a severe shortage of physicians for a given geographical area. The students are recruited into the innovative track from that area and have either an explicit or implicit contract to return to practice medicine in that area upon graduation.
- The average age of students admitted to innovative tracks in United States schools is three to six years greater than that of students admitted to the traditional tracks (Item 61).

  Students in the United States who volunteer for an educational experience that varies so greatly from the norm, and that incorporates so many features of adult learning theory, are likely to have had several years of independent, self-motivated life experience between graduation and entering medical school. They are more likely to have taken risks successfully and are therefore more willing to take a risk with an innovative medical curriculum in order to obtain a more meaningful education. They are less likely to be attracted to the regimentation of prescribed lectures and laboratories offering little room for self-direction.

Personnel

While all of the schools hired new support staff for their innovative tracks, only half hired new teaching staff (Items 66, 67).

- The budget of an educational institution is directly related to the number of employed personnel, especially the number of

teaching staff. The establishment of an innovative track does not necessarily require hiring more teachers Existing teachers can be shared between the two tracks or detailed to teach in the new track. Fears that an innovative track will be too costly may thus be allayed.

- In most of the innovative tracks, tutors are drawn from both the clinical and basic sciences (Item 68).

  The utilization of faculty from both disciplines facilitates meaningful integration of the sciences. It encourages cooperation in curriculum planning, and it fosters mutual learning. This helps to break down interdepartmental barriers an important side effect of the multi-disciplinary approach.
- All innovative tracks have instituted faculty-development programs. These include workshops on the new educational principles and methods, and on-the-job supervision of new tutors (Item 69).

  Educators who participate in the innovative track must, to some degree, be "reprogrammed" away from traditional teacher-oriented educational methods. For many faculty this is the first time they have ever been offered formal guidance in educational theory and skills.
- Seven schools select tutors who are not necessarily expert in the body of knowledge that students will study in the tutorial group (Item 71).

  This is a reflection of the fact that a faculty member can facilitate learning by being an involved educator, and need not be a specialist in the area of medical knowledge under study. Utilizing this reality in the program may hasten the dissolution of interdepartmental barriers built on discipline-specific expertise.Track planners can focus on more relevant skills of educators, such as the ability to facilitate a tutorial group's learning, or the ability to encourage students' responsibility for their own learning.
- Most innovative tracks have devised rewards for faculty who participate in their programs. These rewards vary considerably among institutions from increased monetary rewards, to more travel opportunities, to enhanced consideration for promotion, to faculty development (Item 72).

  The thrust of activities of a faculty depends on what is valued in their institution. Rewards that are developed for faculty participation in the innovative track usually stand in stark

contrast to the dearth of rewards for traditional teaching. They invest education with a new value. Whether such a reward system can be sustained after the innovation becomes an established program, or whether such rewards can be slowly introduced for teaching activities in the traditional track, remains open to question.

Program evaluation

- Innovative tracks vary in the degree to which a program evaluation plan is in place. Some have established funded program evaluation teams from their inception, while others have mounted retrospective evaluations years later. Most of the schools can produce a demographic description of their student population and have the ability to compare academic performance between students in the innovative track and those in the traditional track. Half of the schools are assessing students' attitudes toward their education, and half are studying the impact of the innovative track on the institution (Items 75, 76, 79, 80, 84, 85).

  Developing the evaluation technology to measure a broad array of program parameters is often costly and logistically difficult. When budgets are tight, program planners will understandably channel scarce funds toward basic program needs rather than toward program evaluation. Innovative-track programs, therefore, need easy access to inexpensive, easily adaptable program evaluation instruments. A consortium of schools sharing such tools and expertise would facilitate needed educational research on these important innovations. Task Force Seven on Program Evaluation of the Network of Community-Oriented Educational Institutions for the Health Sciences is one vehicle for facilitating such research.

Outcomes

Measures of long-term outcomes of the innovative tracks are not plentiful. Most programs have not existed long enough to have a sizeable number of graduates in practice. However, certain early outcomes are important and worthy of discussion.

- Career choice: The tracks in each of the four schools with sufficient data to assess career preference are all community oriented. It was found that more graduates from the innovative track chose careers in primary care or family medicine than did graduates from the traditional track (Item 86).

  With few exceptions, students who choose the innovative tracks are self-selected. They may have been more inclined to select careers in primary care at entry. The support for primary care in the early, sustained, community-based experiences that are featured in these tracks is likely to reinforce that early interest. Further, these tracks usually offer their students community-based, primary-care physicians as role models. This experience gives legitimacy to a career different from those legitimated by the medical or surgical subspecialty role models predominating in traditional programs.
- Intellectual skills: Five schools collected comparative data on cognitive performance and/or problem-solving ability of students in both tracks. In three of the four schools with data on intellectual skills, these abilities were roughly the same in both tracks. In the fourth school, traditional track students performed better. In all three schools which assessed problem-solving ability, however, innovative track students performed better (Items 88, 89).

  It is understandable that track students emphasizing problem-solving perform better in this skill. But it is surprising to many that students in the innovative tracks generally perform as well as their traditional-course peers on multiple-choice tests of memorized, scientific material. Perhaps they perform well because what they lack by not being presented with large volumes of isolated basic science facts, they make up for by contextual learning that has relevance and meaning.
- Faculty attitudes: Four of five schools collecting such data found that faculty attitudes toward the track improved after personal participation in the innovation. In the other school, faculty attitudes remained the same (Item 91).

  Experience is the best teacher. One of the best ways of recruiting faculty to the innovation is to offer them practical experience with the new method, particularly if they can deal directly with the students.
- Influence of the innovative track on the traditional track: Four schools report that their traditional tracks are now using more

small-group discussions, and five schools report an increase in the use of problem-based learning in their traditional tracks (Item 92, 93).

Perhaps the most important outcome of the innovative track experiments to date is the degree to which they have influenced traditional education in their institutions. This is a consequence of several factors: the high visibility of the new programs, the attention they pay to building institutional and external support, and the cross-fertilization of ideas that is made possible when a traditional and innovative track run in parallel in the same institution.

- Influence of the traditional track on the innovative track: Five schools indicate that their innovative tracks have been significantly influenced by their traditional ones. All five reported an increase in the numbers of organized lectures and laboratory sessions in the innovative tracks. And in three of these schools there has been an increase in the use of objective assessment techniques in evaluating their students (Items 97, 99).

Innovative track planners usually set out to influence traditional medical education. But to some extent, the innovation becomes modified by the established, host institution. It is well to reflect on the fact that the innovator's zeal too easily dismisses too much of tradition that may be of value and strategically, it is important to remember that no innovation can survive without compromise and accommodation.

8 Table 1. Answers to the questionnaire submitted by the eight schools

	Mexico-UNAM	Michigan State – Upper Peninsula	University Philippines	Bangkok-MESRAP	New Mexico	Rush	Harvard	Shanghai
Getting started								
A. *General data*								
1. Year track began	1972	1972	1974	1976	1977	1982	1984	1984
Year students entered	1974	1974	1976	1978	1979	1984	1985	1986
2. Population of								
Med school city	18 million	130,000	6 million	5 million	350,000	7 million	3.5 million	12 million
Track city	18 million	15,000	9,000(Palo)	120,000	350,000	7 million	3.5 million	12 million
3. Track began with and promoted by								
Charismatic leader	X	X		X	X	X	X	X
Pres/Vice-President			X	X			X	X
Dean	X	X		X		X	X	X
Chairman/Faculty					X			X
Students				X				
Community		X						
4. Key early activities to build support								
Multidisciplinary, small planning groups		X		X	X	X	X	X
Admin. support	X	X	X	X	X	X	X	X
5. External funding initially		X	X	X	X		X	
6. Internal funding reallocation	X			X		X	X	
B. *Rationale, motivation, incentives for change by track*								

7. Motivations for change in general								
Too few primary care physicians	X	X		X	X			
Learning too passive	X	X		X	X	X	X	X
Lack of integration in basic, clinical sciences	X	X		X	X	X	X	X
8. Track bypasses dept. control	X	X		X	X	X	X	
9. Innov. track for volunteers on ethical approach to change	X	X		X	X	X	X	X
10. Small track minimally threatening		X		X	X	X	X	X
11. Track offers an experimental design		X	X		X	X	X	X
12. Track increases curricular options	X	X		X	X	X	X	X
13. Track offers new approach for community-based education	X	X		X	X			
C. *Forces supporting change*								
14. 3 most important forces supporting change								
1	national mandate	more rural MD's	univ. leadership	MD shortage	legislative mandate	desire to improve education	dean	MDs meet future
2	dean support	admin support	national interest in primary care	physician maldist.	physician maldist.	opportune time	separation of tracks	government mandate
3	community needs	legislative support	rural manpower needs	inadequate rural care	external funding	dedicated faculty	money	university initiative

Table 1 (*continued*)

	Mexico-UNAM	Michigan State – Upper Peninsula	University Philippines	Bangkok-MESRAP	New Mexico	Rush	Harvard	Shanghai
15. External mandate (national, state, legislative body, WHO, etc.)	X	X		X		X	X	X
16. Institution's desire to lead reform	X	X		X		X	X	
17. Desire for national, international acclaim	X			X	X	X		
18. Having strong link with other schools	X			X	X	X	X	X
D. *Forces resisting change*								
19. Perceived threat to established structure					X	X	X	X
20. Faculty fear of increased workload		X		X	X	X	X	X
21. Faculty concern re teaching outside of area of expertise		X		X	X		X	X
22. Faculty loss of control		X		X	X		X	X
23. Faculty fear of reduced chance of promotion					X		X	X
24. Fear of conflict				X	X		X	
25. Institutional discord over evaluation	X	X	X	X	X	X	X	X
26. Concern re making changes too rapidly	X		X	X				X

E. *Strategies to overcome barriers to change*								
27. Develop broad-based support			X	X	X	X	X	X
28. Obtain government financial support	X	X	X					X
29. Develop community support		X	X	X	X			
30. Recruit influential faculty			X	X	X		X	
31. Provide part of extra funding to departments			X	X	X		X	
32. Use community physicians as clinical faculty		X	X	X		X		
33. Develop faculty advisory group		X	X	X	X	X	X	X
34. Be willing to compromise	X	X		X	X	X	X	X
35. Be willing to incorporate criticism	X	X	X	X	X	X	X	X
36. Have traditional faculty work with students in innovative curriculum	X	X	X	X	X	X	X	X
37. Have innovative track described as an "experiment"	X	X	X		X	X	X	X
38. Use same faculty to teach in both tracks	X		X	X	X	X	X	X
39. Develop a newsletter		X		X	X	X		X
Curriculum								
40. Years encompassed by track	1,2,3,4	1,2,3,4	1,2,3,4,5	1,2,3,4,5,6	1,2	1,2	1,2,3,4	1,2
41. Area of emphasis of innovation								
Primary care	X	X	X	X	X			
Problem-based learning	X	X	X	X	X	X	X	X
Community-oriented	X	X	X	X	X			

Table 1 (*continued*)

	Mexico-UNAM	Michigan State – Upper Peninsula	University Philippines	Bangkok-MESRAP	New Mexico	Rush	Harvard	Shanghai
Integrated learning	X	X	X	X	X	X	X	X
Other	tutorial	rural			student-centered			
42. Location of track								
At medical school	X	X		X	X	X	X	X
In community	X	X	X	X	X			
43. How curriculum term is divided								
Independent study	0%	50%	–	34%	50%	30%	50%	40%
Small-group discussion	80%	10%	variable	3%	40%	50%	10%	50%
Lecture/lab	20%	5%	variable	43%	0%	10%	11%	
Other	–	35%	–	20%	10%	10%	26%	10%
44. Curriculum organized								
By department				X				X
In an integrated fashion	X		X		X	X	X	
45. Principal learning methods								
Problem-based curriculum	X	X	X	X	X	X	X	
Small-group learning	X	X	X	X	X	X	X	X
Peer teaching	X	X		X	X		X	
Lecture format	X	X	X	X		X	X	X
Community-based experiences	X	X	X	X	X			X
46. Students learn clinical skills during first year	X	X	X		X	X	X	X
47. Patient care first year								
Hosp. inpatient	X		X		X		X	
Hosp. ambulatory							X	
Community-based	X		X		X		X	

48. Community experience during first year	X		X	X	X			X
49. Curriculum time spent in the community	20%	50%	35%	No data	24%	0%	0%	9%
50. Clinical work								
Hosp. inpatient	40%	–	55%	74%	63%	80%	80%	33%
Hosp. ambulatory	40%	–	0%	8%	5%	18%	15%	67%
Community-based	20%	–	45%	18%	32%	2%	5%	0%
51. Students are allowed to transfer between tracks		X	X		X	X		X
52. Number of students/tutorial	20–25	6	10	8–16	5	6	6–8	8–15
53. Number of tutorial meetings/week	5	2	2	5	2.5	2	3	3
54. Average duration of each tutorial meeting (hrs)	4	2	3	2	3.5	2	2	3
55. Tutor time/week (hrs)	20	4	5	10	9.5	4	6	no data
56. Each tutorial group stays together	40 wks	4 yrs	11 wks	5 wks	8 wks	12 wks	8–12 wks	no data
57. Students involved in curriculum planning	X	X			X	X	X	
Admissions								
58. Number of students/year								
Traditional track	1,140	70	–*	100	53	300	125	620
Innovative track	140	6 (of 35)†	60	50	20	36	40	30
59. Number of students admitted to innovative track								
Initially	280	10	13	10	10	12	24	30
1986	140	6	26	50	20	36	40	
Future projection		6	26	50	20	30		

* The University of the Philippines has two, administratively, distinct medical schools. One, traditional, is in Manila, while the smaller, innovative one is on the island of Leyte, which we refer to here as a "track."

† Of 106 medical students admitted to Michigan State University each year, about 35 choose the innovative problem-based curriculum. Of those, 6 are chosen to later enter the Upper Peninsula Programme.

Table 1 (*continued*)

	Mexico-UNAM	Michigan State – Upper Peninsula	University Philippines	Bangkok-MESRAP	New Mexico	Rush	Harvard	Shanghai
60. Students are admitted to the track								
Directly		X	X	X				
After admission	X		no data		X	X	X	X
% applicants admitted to track					35%	10%	60%	
61. Average student age on admission								
Innovative track	18	28	17	18	28	26	23	18
Traditional track	18	22	21	18	25	22	23	18
62. Male:female ratio								
Innovative track	1:1	1:1	1:2	3:1	1:1	1:1	3:2	1:1
Traditional track	1:1	1:1	no data	3:1	2:1	3:2	3:2	1:1
63. Selection into track								
Assigned	X							
Volunteer		X	X	X	X	X	X	X
Random	X		no data		X		X	
"Pick the best"		X	no data			X		
Special recruitment			no data	X				
64. Selection criteria								
Intelligence		X		X	X	X		X
Small-group skills		X		X	X	X		
Maturity		X		X	X	X		
Rural interest		X	X	X	X			
Rural background		X	X	X	X			

Personnel

65. Innovative track reports to:	Faculty	Dean, Dept of Fam. Med.	no data	Univ. Program Comm.	Dean Steering Curr. Comm.	Dean	Acad. Dean Curriculum Committee	President
66. New teaching staff were hired for the innovative track	X	X		X				
67. New support staff were hired for the innovative track	X	X		X	X	X	X	X
68. Track tutors are:								
Basic science faculty								
Clinical science faculty						X		X
Both	X				X		X	
69. Programmes offered to participants in innovative track								
Faculty development					X	X	X	X
Education workshops	X			X	X	X	X	X
Faculty/student video				X		X	X	X
Educational support services			X		X	X	X	X
70. Tutors								
Assigned by dept.					X			X
Selected by innovative-track staff	X			X	X	X	X	X
Volunteers				X	X	X	X	X
Mandatory				X				
71. Tutors must be curriculum experts								X
72. Faculty rewards								
More money				X	X	X	X	X
Travel						X		
Promotion				X	X			X
Development of new educational skills				X	X	X	X	

Table 1 (*continued*)

	Mexico-UNAM	Michigan State – Upper Peninsula	University Philippines	Bangkok-MESRAP	New Mexico	Rush	Harvard	Shanghai
73. Number of medical students (per year) in school	1,140	106	no data	100	73	120	165	650
74. Number of medical students (per year) in innovative track	140 (13%)	6 (6%)	60 (100%)	50 (50%)	20 (27%)	18 (15%)	40 (24%)	30 (5%)
Evaluation								
75. Track has developed its own curriculum assessment	X	X	X	X	X	X	X	X
76. There is a monitoring body for both tracks	X	X		X	X	X	X	X
77. New assessment tools	X	X	X	X	X	X	X	X
78. Self and peer assessment done	X	X	X		X	X		
79. Both tracks have same exams developed within institution				X		X		X
80. Both tracks have same exams administered by outside body	X	X	X		X	X	X	X
81. Track students take multiple-choice tests	X	X	X					
82. What % of assessments are "objective" tests	50%	90%	50%	75%	0%	5%	35%	no data
83. Student assessment								
By department			no data					X
Interdisciplinary		X			X	X	X	
Both		X		X			X	

84. Features of program evaluation								
Mechanism for evaluating entire program in place				x	x	x	x	x
Evaluation is separately funded				x	x		x	
Evaluations give program frequent feedback				x	x	x	x	x
Program evaluates both tracks					x	x		x
85. Aspects of programs studied								
Social, demographic status of students	complete	no plan	complete	current	complete	current	current	current
Student attitudes toward education	no plan	no plan	planned	current	complete	current	current	current
Self-assessment by students	complete	current	planned	current	planned	current	no plan	current
Career choices, practice location	complete	current	planned	planned	complete	current	no plan	no plan
Academic performance in each track	complete	current	current	current	complete	current	planned	current
Teaching staff attitudes	no plan	current	current	current	current	current	planned	current
Institutional change	complete	no plan	planned	current	complete	planned	no plan	no plan
Track outcomes (Relative to traditional track)								
86. Track career choice								
Primary care, family practice	more	more	more	no data	more	no data	no data	no data
Rural/underserved	no data	no data	more	no data	no data	no data	no data	no data
87. Positive attitudes toward learning	no data	more	no data	no data	more	no data	no data	no data
88. Cognitive skills	no data	same	no data	less	same	same	no data	no data
89. Problem solving	no data	more	more	more	no data	no data	no data	no data
90. Lifelong learning	no data	more	no data	no data	no data	no data	no data	no data

Table 1 (*continued*)

	Mexico-UNAM	Michigan State – Upper Peninsula	University Philippines	Bangkok-MESRAP	New Mexico	Rush	Harvard	Shanghai
91. Improved teaching staff attitudes	no data	no data	more	no data	more	same	more	more
Influence of innovative on traditional track								
92. Small-group learning	increase	no data	no data	increase	increase	no data	increase	no data
93. Problem-based learning	increase	no data	no data	increase	increase	increase	increase	no data
94. Primary care, community experiences	increase	no data	no data	increase	no data	no data	no data	no data
95. Varied student assessment	increase	increase	no data	increase	increase	no data	no data	no data
Influence of traditional on innovative track								
96. Teaching staff control of curriculum		increase		increase	increase		increase	no data
97. Use of objective assessment		increase		increase	increase		no data	no data
98. Unstructured student time				decrease			no data	no data
99. Organized lectures and labs	increase	increase			increase	increase	increase	
Future								
100. Continuing external funding required		X		X				x
101. Future plans								
Whole school like new track				X				
Blending of tracks		X	X			undecided	X	
2 tracks – "as is"						undecided		
2 tracks – both evolving	X				X	undecided		

Part III

Program studies

UNITED STATES
MEXICO
Mexico City
Kilometers
0
200
Statute miles
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National Autonomous University of Mexico, Mexico

The general integrated medical program (A-36)

Fernando Cano Valle, Ernesto Villalvazo Siordia, Hernan Gonzalez Wood, Jorge Veramendi Carnicer, Alma Rangel de la Vega, Lindorfo Cardenas Garcia, Armando Lievana Durazo, and Pablo Moreno Silva

Overview

Background

In Latin America, medical education has undergone important changes in recent decades. Much of this change is geared toward meeting the health care needs of the great majority of the population — changing the orientation of medical graduates away from traditional, private, specialty practice, and instead toward community service in general medicine and primary health care. But this has not come easily and universities have responded slowly.

In the 1950s in Latin America, faculty at some schools questioned key aspects of their traditional educational model. They criticized the rigid, antiquated, lecture-oriented curriculum. They also felt that the evaluation of students was too narrowly conceived. Students were rewarded for non-critical regurgitation of theoretical content which bore little, if any, relationship to what the students really needed to know. In the 1960s there emerged a growing awareness of the need to teach Social and Preventive Medicine, an awareness that swept through Latin American medical schools.

These trends were reinforced in the 1970s, when the Pan American Health Organization sponsored the "Americas 10-Year Health Plan". The Plan was a regional initiative, and its objectives were a) to redirect health care delivery toward the majority of the population, and b) to give greater emphasis to preventive medicine. These recommendations were intended to affect all elements in the health sector, not just health science schools. In those years, therefore, the concept of wedding health science education to health care delivery emerged as a new curricular strategy. This fostered a closer administrative relationship between schools of medicine and the government's health sector.

In highly industralized countries, it may be appropriate to produce physicians who are geared to enter specialties in which advanced technology is heavily utilized. However, this is not suitable in developing countries, such as Mexico, which are now being pressured to gear their medical education toward the larger community – to address the social concomitants of health problems and to deemphasize costly high technology in favor of more economical prevention of disease.

In Mexico, the implementation of curricular reforms which address such broad social problems and depart drastically from educational traditions, posed certain risks. Reformers could be accused of developing a second-class education for second-class physicians for a second-class country. Many feared that curricular emphasis on primary or community-based care would translate into a "less scientific" education; that too much practical learning would supplant a solid grounding in scientific theory.

A new curricular track

In 1974 the School of Medicine of the Universidad Nacional Autonoma de Mexico (UNAM) funded a new program: the Programa de Medicina General Integral (PMGI), originally named A-36 because there were 36 students to each learning group. PMGI is an experimental, integrated, community-based and community-oriented medical education track now accepting approximately 150 undergraduate medical students each year out of the admitted class of about 1000.

The first and fundamental objective of the new curriculum was to develop professionals not only with sound scientific and technical knowledge, but also with a deep and realistic appreciation of Mexico's social, economic, and health problems. Graduates had to possess a clear concept of man as a biological, psychological, and social being. And they had to function with an integrated concept of medicine. Such broad characteristics are needed if a physician is to carry out such diverse services as health promotion, disease prevention, and rehabilitation.

The generation of change in the practice of medicine by altering the education of medical students was a process that required joint planning between those coordinating health care delivery and those generating the health manpower (universities). For medical educators, this called for a change in curriculum design – shifting

from sole reliance on content objectives to the inclusion of process objectives (*1*).

Other curricular changes

In 1975, the Department of General Family and Community Medicine was founded. This provided the graduate link in the primary care, community-oriented continuum in medical education. It introduced a series of educational innovations, including a sustained, four-month long, rural community rotation for third-year family practice residents in village-run clinics in Tlaxcala State. In 1981, the Center for Studies in Primary Health Care was also founded. This provided a model site for research, education, and service in primary care—drawing all elements of the health care team together. It is located in health center clinics, and is administered jointly by the Secretary of Health and UNAM's School of Medicine.

In 1984, PMGI, the Department of General Family and Community Medicine, and the Center for Studies in Primary Health Care became integrated units under the Secretary of Teaching and Research in Primary Health Care. The office of the Secretary coordinates all UNAM medical school activities regarding both primary health care and Mexico's national health priorities. Since UNAM is the national university, its innovations can have far-reaching implications for curricular reform throughout Mexico.

In 1985 another important educational innovation was initiated (Fig. 2). A new integrated medical school curriculum replaced the "traditional", subject-oriented track for all entering students. The new curriculum was an outgrowth of the successes of PMGI, and emerged after an extensive analysis of the traditional curriculum which had been in operation since 1967. It was also an outgrowth of a broadly-based consensus of what UNAM's medical graduates' profile should be. The curriculum involves an innovative plan which integrates the subject matter—avoiding fragmentation into separate disciplines. It provides early clinical and community experience, and seeks to imbue students with a scientific, humanistic perspective, and with a philosophy of service to patients, their families, and the community.

In summary, our medical school's approach to educational reform started with the pressing concerns of our country's unmet health care needs. This was translated into a call for educational reform linking education and service, and for orienting graduates toward primary

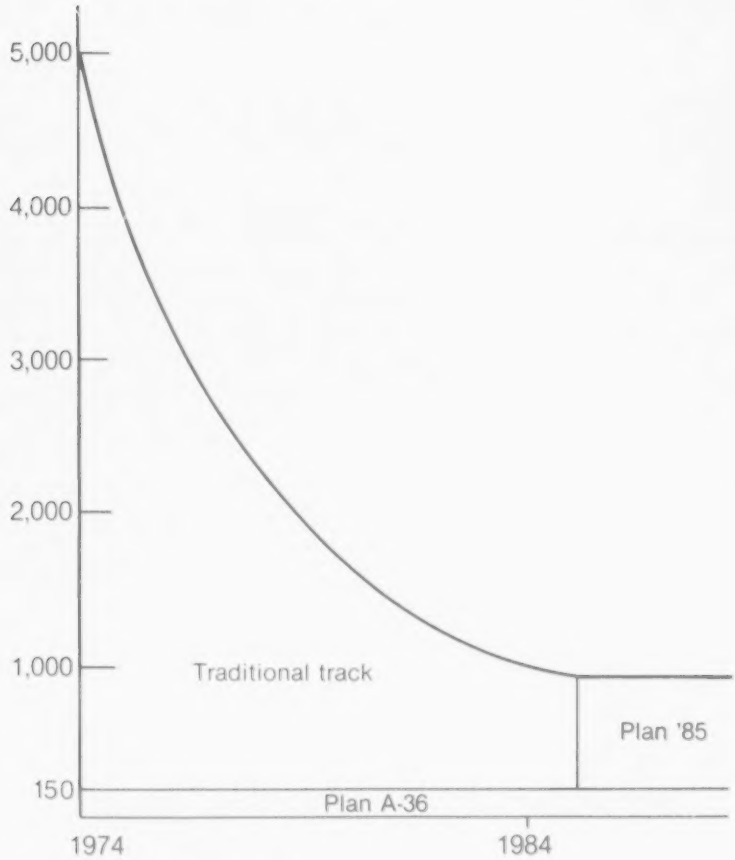

Fig. 2. Changes in the tracks at UNAM from 1974 to the present (Y axis = no. of students enrolled)

care in the community. Development followed in the form of an innovative, parallel track. Concurrently, UNAM's strategy encouraged other innovations at the undergraduate, graduate, service, and research levels. Finally, the favorable results of the

undergraduate, innovative track have been generalized for the benefit of all medical students at our university.

Program de medicina general integral (PMGI)

Overview

The PMGI was initiated in 1974 as an alternate curriculum to traditional medical education, existing in the same School of Medicine at UNAM. Students in both tracks take the same final professional examinations, receive the same diplomas, and are offered the same professional career options.

The proposal to establish an innovative track was approved by the technical council of the School of Medicine at UNAM in 1974. The first students were accepted into the new program that same year. The project was revised, and the revision was published by Dr. Jose Laguna Garcia and others in Educacion Medica y Salud (*2*). (Dr. Laguna is currently the Director of the National Council of Health.) The innovative teaching model was to meet the following goals:

1. The development of physicians suited to the general practice of medicine (non-specialized, oriented toward primary care).
2. The reduction of the traditional six-year curriculum to five years by eliminating the undergraduate internship a traditional, one-year period of practical training, and by integrating basic and clinical sciences in the first two years.
3. The integration of scientific theory and clinical practice.
4. The integration of the social and biological approaches to health and disease.
5. The facilitation and encouragement of a community-oriented, preventive approach to primary-care practice.

In the initial curricular structure the following innovative educational strategies were employed:

1. Theoretical and practical learning were integrated through presentation of theory followed immediately by practical application.
2. Theories of psychological levels of learning were utilized, and Piaget's approach was chosen. In this approach, knowledge is

arrived at by an inductive process of building and synthesizing experience and information.

3. Medical practice was presented as a continuous process of diagnosis and problem-solving. It is around this process that scientific information is structured and acquires meaning.

4. Diagnosis and problem-solving were presented in increasing complexity. Thus, clinical cases would be designed to suit the students' abilities—abilities which would increase each year. Further, the content of case problems were varied according to the students' learning environment—from the community to the health center, from the outpatient clinic to the hospital.

5. Each multidisciplinary unit of study was termed a "module", and was composed of biological, psychological, and social information, guided by a list of cognitive, psychomotor and attitude objectives to be met by students.

6. During the students' first and second years, all theoretical and practical learning was carried out in medically underserved districts in Mexico City. An academic unit was built in each of four such districts around the city,each unit next to a Health Center. The units served as home-base study areas for students and faculty. Students in their third and fourth years, however, carried out their activities (learning/service) at the clinics and hospitals belonging to the Instituto Mexicano del Seguro Social (IMSS), the largest of Mexico's health insurance plans, which serves primarily urban workers (comprising about 1/3 of the population). IMSS is under the jurisdiction of the Social Security Institute.

7. In A-36 the professor's traditional role as a knowledge giver would be transformed into that of a tutor who facilitates and acts as a role model for the students. Thus, the tutor was also a primary-care physician who remained with his or her tutorial group for an entire academic year. The tutor's mission was to organize all learning activities for the students.

8. During each module, the student's activities were characterized by the following features: a relevant clinical service setting, individual use of self-directed-learning tools and basic texts, laboratory sessions with resource personnel, group sessions to review learning units, special-topic seminars, bibliographical sessions, community-based preventive-medicine teaching and research activities, and diverse forms of evaluation of their performance.

How the program began

The implementation and development of PMGI required no external funding. Its financial support came through internal reallocation of monies within UNAM. The source of the money was a university-wide experiment promoting an "open university concept" which was based upon independent study. Since medical education couldn't realistically be conducted totally by self-directed study, the medical school's alternative proposal for attracting this money to the Faculty of Medicine was the creation of PMGI.

In the beginning, students were recruited voluntarily from the first-year classes admitted to the School of Medicine. Faculty who were to begin tutoring in PMGI were trained extensively over a six-month period before taking on their teaching responsibilities. Thus, UNAM offers one of the longest faculty development programs in the world. While our program stresses integration, virtually all textbooks are divided by specialty or discipline. Consequently, new, integrated resources had to be developed to meet the needs of the innovative curriculum. A series of integrated study materials was then produced for the students, to help orient them toward six areas of knowledge: biology, epidemiology, sociology, psychology, pathology, and clinical medicine. The content of these materials increase in diversity and complexity as the learning modules move through the two years. They also facilitate the integration of knowledge from all of the four years.

From the very beginning, the evaluation of students in PMGI was to be more diverse than traditional methods, and better suited to the broad objectives of the program. Evaluation was to be wide-ranging, with the aim of constantly giving feedback to students so their behavior could be favorably molded, not simply judged.

In 1976, an agreement was signed by the dean of the School of Medicine of UNAM and by the coordinator of PMGI on one side, and by the head of teaching and research of IMSS on the other, to develop the third and fourth year of the program in medical units belonging to IMSS. Students would spend their third year in IMSS family medicine units, and their fourth year in general and ob/gyn hospitals. PMGI students would thus not only experience the integration of basic and clinical sciences in the classroom, and of theory and practice in the community, but would experience a range of health service systems public clinics under the Ministry of

Health in their first two years, and insured workers' clinical care under IMSS in their second two years.

Specifics of PGMI study plan

Level one (years one and two)

During Level One, students study six modules covering human growth and development. This is coordinated with in-service training at the affiliated health center. There, students learn the rudiments of early diagnosis and prevention, through contact with health center clinic patients and by home-visiting and surveys with the population at large. Integration of clinical and classroom work is also achieved by functioning in such settings as local ob/gyn hospitals. Thus, the work during the first year is carried out in the unit classrooms, health center clinics, community-at-large, and ob-gyn hospitals. Students begin to take night call at the ob-gyn hospitals after they have studied intrauterine growth and development. Their learning is guided by physicians in these clinic settings (Fig. 3).

The basis of the second-year curriculum is the interrelationship between the body systems, the whole organism, and the environment. It is covered in 12 modules (Fig. 2), and again is integrated with the Health Centers, and also with Programs of Elementary School Health and Community Research.

Each week in the first two years, students participate in an ongoing study of their community. This gives the students a basic understanding of the theory and practical reality of social, economic, and medical problems. In one such study, the students, throughout the first school year, followed in detail these problems of a small group of families in the community. In their second year, students conduct a school health and community research project, allowing them to study the community in even further depth.

In order to increase the educational effectiveness of the community health portion of the curriculum, four new academic units were erected. Each of these was adjacent to a different health center run by the Ministry of Health. The units house facilities for the day-to-day curricular activities of the faculty and students, thus improving immensely the logistics of integrating classroom, clinical, and community activities. Each unit has four classrooms, two for first-year and two for second-year learning groups. Each group has

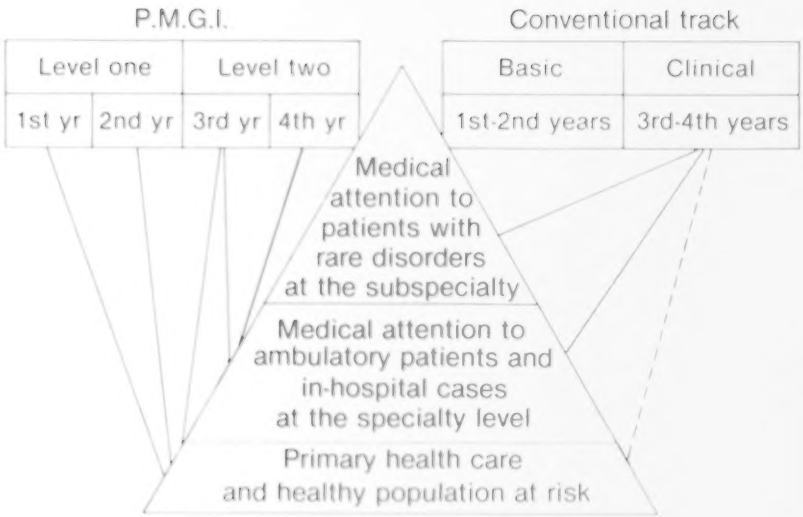

Fig. 3. Types of medical care at each level of each track.

individual desks, a space for group work, and access to a central laboratory adjoining the classrooms.

The four units are at the following locations:

1. Agrícola Oriental.
2. Netzahualcoyotl.
3. Cuajimalpa.
4. Ciudad Universitaria.

Mexico City is the world's largest metropolis, with over 18 million inhabitants, and it is still growing rapidly. The city's greatest health care deficiencies are in the outlying or marginal areas where income is low and services inadequate. For this reason, A-36 located its four first-level educational units outside the city core. Two sites, Netzahualcoyotl and Cuajimalpa are representative of the diversity of settings in which A-36 students learn and serve.

Netzahualcoyotl is a rapidly growing, flat and dusty marginal area northeast of the city core. It is inhabited mostly by farm workers

who have immigrated to the city in the past 15 years. There is high unemployment, and those employed are mainly in blue-collar jobs. The crime rate is high. However, conditions in the district have steadily improved so that most streets are now paved, and housing is of better quality.

Cuajimalpa is a district southwest of the city core. It is in a hilly area with a mixed urban-rural flavor. There is considerable stability in the community because many families have lived there for generations. Many families also own small plots of land which provide vegetable gardens to improve family nutrition, or which house small animals for meat and eggs. Children in the community often tend the garden and the animals in addition to going to school. While family heads often work in the city, many run small businesses in the community.

Level two (years three and four)

During Level Two, the second two years of medical school (Figs. 2 and 3), the curriculum concentrates on the natural history of disease. It covers the basic, clinical, epidemiological, and social aspects of the most frequent pathologic conditions encountered in Level One care. It consists of three modules with a number of submodules (Fig. 2).

In the third year all activities take place in five Family Medicine Units with assorted support services. The fourth year takes place in five General Hospitals (Fig. 3). All of the General Hospitals have Clinical Laboratory and X-ray Departments. Level Two of the program maintains its tutorial orientation by recruiting clinical tutors in the different areas where the students rotate (2 hours/week/tutor). The Level Two program coordination is done jointly by IMSS and the University.

PMGI students not only maintain their objective-based learning, but they also participate in a wide variety of community health care delivery related to diabetes mellitus, high blood pressure, tuberculosis, screening for cervical and breast cancer, rheumatic fever, family planning, immunization campaigns, health promotion, and disease prevention.

Evaluation

Because PMGI students are able to integrate their basic and clinical sciences, the length of their curriculum is one year less than that of

medical students educated traditionally in Mexico. Students in both tracks spend their final year in an underserved area for their National Service. Evaluation is integrated into the teaching-learning process. Students take pre-tests before each module. Weak points are identified to help guide their study. During the module, evaluations take place to detect areas of strength and of slower progress. This permits "mid-course corrections" for the students. Finally, students are given an end-of-module evaluation. Each student is evaluated in three areas:

1. Cognitive area (knowledge)
2. Psychomotor area (clinical skills)
3. Attitude area (relationships)

The cognitive area is evaluated by the centralized evaluation section of the PMGI. They develop tests for all A-36 students, while the tutor complements this work by administering periodic, brief evaluations. Evaluation of attitudes depends solely on the tutor who applies established parameters to the group. Psychomotor skills are assessed by clinical competence tests, problem-solving exercises, and by evaluation of the teaching of peers in a clinical setting, and of clinical case work.

Clinical activities and community work are not graded - students pass this section by carrying out the activities.

Role of various institutions in collaboration with PMGI

From the outset, planning of the PMGI's Level One has been coordinated with the clinical activities of health care units run by the Health Section of the Ministry of Health and by IMSS. The program incorporates physicians, already working at these health centers, as teachers in the program.

During the early years, the Program was carried out by medical specialists such as pediatricians, general internists, gynecologists, etc. But, since 1982, there has been an increasing participation by family physicians, and of support services from departments such as psychology, dentistry, epidemiology, and family planning, and from clinical laboratory and X-ray services. This change brought the program closer to our goal of integrating the care of the family unit.

Today, students work in eight health centers. Sixty-one tutors have been recruited in these centers, and are paid for two hours per week by our program. Sixty percent of them are family or general physicians. Planning and supervision of the activities in each health

center are carried out jointly by the director of the center and the head of the adjacent academic unit.

Faculty development

To prepare IMSS physicians for this major teaching role, a 20-hour preparation course was given in the selected units to six core instructor physicians from IMSS and to the associated 189 faculty helping in this educational endeavor. The spirit of an active modular tutorial teaching program was to be maintained in the Second Level, and small groups of students were to rotate together in each of the sites.

It should be noted that both IMSS and ISSSTE are themselves working toward a greater focus on primary care. This development brings them closer to our program's objectives for the development of human resources qualified to provide this type of care.

Social, educational, and political forces supporting and resisting the program of general integrated medicine

An important, relevant, innovative idea in education cannot become a curricular reality without influential supporters. In the case of PMGI the prime movers and key supporters came from the administrative leadership, i.e., the dean of the faculty of medicine, the rector of the University, and influential membersof the Ministry of Health. When our experiment began we had no role models, in other medical schools, from which to learn. Thus, our search for new pedagogic ideas was promoted not by a wish to emulate other schools, but by the growing awareness of a need for educational change. And the educational technology we incorporated into our innovation was drawn from the learning theories proposed by Bloom, Mager, and Skinner.

After 12 years of operation, the fundamental aspects of PMGI have not changed. In fact, the growing call for changes in health care delivery, nationally and internationally, have grown closer to PMGI's original innovative curricular concepts. Over the years these changes have been expressed in the Alma Ata Declaration (1978), which called for "Health for All by the Year 2000". It was later expressed in the General Law for Health, 1983; the National Development Plans of 1983 and 1988; and structural changes in health care delivery, such as the family care modules in the Secretary

of Health's centers, and the growth of family medicine units in the IMSS health care centers.

As with all major innovations, there has been resistance to change within our institution, an institution accustomed to traditional ways of teaching medicine. Ironically, in some ways PMGI is better understood outside UNAM than within. Many factors account for the general internal skepticism about PMGI. First, the educational technology it introduced was new, and raised suspicions that learning would be superficial. This was exacerbated by such PMGI elements as the elimination of an entire year (the internship) in the student's training; by the teaching of anatomy without cadavers; and by having the students learn basic sciences guided not by a basic scientist but by a primary-care physician. And clinicians, even the assigned preceptors, were skeptical that the students, without a solid clinical background, could function adequately with patients in the community or clinic.

The program faced other dilemmas. While constructing a curriculum stressing integration of disciplines, and balancing the clinic with the community, the program also had to prepare students to function adequately on very traditional evaluation criteria, criteria that were sometimes antithetical to the program. Further, while the program asked students to learn in an integrated, modular manner (blending classroom, laboratory, and community), all available resources were narrow and discipline-based.

But there has been great progress in overcoming these obstacles. The decisive support obtained from all of the University authorities, especially at the School of Medicine, has been substantial and ever-increasing, mainly because of the rich educational experience and the far-reaching goals achieved with this alternative track in medical education. While none of the UNAM faculty had themselves learned in the manner in which their PMGI students were learning, most who worked initially with the Program soon became converts to its methods.

To overcome the lack of integrated materials for students' tutorials, PMGI faculty mounted an enormous effort to produce relevant study material de novo. An unanticipated benefit of this task was that it presented PMGI with an opportunity to recruit support from traditional faculty for the development of materials in the different basic science disciplines. This curricular "consultation" provided a bridge between the two tracks. But these bridging activities were not always successful. At first, traditional track

faculty input on the modules was inadequate. This was probably due to the separation from the development of the new program. They didn't understand the objectives of the program or appreciate the importance of integrated learning. A more successful strategy was to have PMGI faculty write drafts of the modules and then have experts both review the drafts for accuracy and modify them as required.

Evolution of the programa de medicina general integral

The long road traveled through the years has not been easy. It is the price one pays for innovation, the price of defiance. PMGI had to contend with criticism by some who were bent on seeing only shortcomings while ignoring the rich educational experiences that the Program affords its students. We believe PMGI is today the oldest and perhaps most solid educational experience in Mexico for preparing graduates to be general physicians. Its goals and methods have important implications for other innovative programs in Latin America.

Over the past 12 years we have improved in response to ongoing self-criticism, always trying to adjust our curriculum to the terminal goal of producing top quality general physicians, who are aware of their "responsibility to know" and their "obligation to serve" (*3*).

Since its origin, the Program has been subject to modifications. The focus on newer educational technology during the first years skewed our efforts too much in one direction. Now, as we revise the curriculum, we seek a balance of program development in all areas. This constant revision is carried out by tutors and educational advisors working in PMGI. For example, the contents of the modular study materials had to be expanded and updated, because our graduates take the same professional examinations as their classmates from the conventional track. In the beginning, no such materials existed. But today we can proudly say that each module has its own updated manual. All of this material comes to almost 15,000 pages, a credit to the intense work of faculty in both Level One and Level Two of the Program.

Health center and community work has also been modified and adapted according to a variety of circumstances. For example, at first, PMGI students working in the community were overwhelmed with clinical demands devoted to the diagnosis and treatment of disease. But over time we have been able to rechannel their energy

toward the more original learning objectives of the program, reinforcing their experiences in health promotion and disease-prevention in all programs run from the health centers.

The community program for Level One has evolved into the following four-part structure:

1. The "Community Study" program allows the student to understand fundamental sociomedical problems as they affect the health-disease process.
2. The "Following of Families" program allows students to observe and understand family dynamics, while witnessing disease in the family at close range.
3. The "School Health" program combines a community-based learning activity for the students, with clear service benefits to the community. The students practice their clinical skills with schoolchildren, maintain health records on them, and refer the children to the health center if necessary. The students also give health promotion talks to schoolchildren and their parents and teachers.
4. A "Research Project in Public Health" reinforces the student's scientific thought process by having the student design a research protocol concerning a community health problem.

Not all attempts to involve students in the community succeeded. For example, the students' community work was originally supposed to be carried out through representative, community-based health committees. It failed. The Ministry of Health was not able to develop adequate committees for there was too much resistance to the idea by community leaders. They were suspicious of formal organizational structures which they felt were imposed on them from the outside. PMGI has thus had to accommodate itself to the realities of community resistance.

The needs of primary health care therefore form the backbone of our curriculum. It is important to reinforce this fact because primary care is now the major focus of all medical care in Mexico, and it has been a core concept in virtually all national systems of health since the Alma Ata Declaration. Significantly, the visionary creators of the A-36 program conceived it a full five years prior to the Declaration. The concordance between PMGI and Mexico's national health care goals is reinforced by introducing PMGI students to community-based health care for families in Level One and assigning them to family medicine units in Level Two.

Influence of PMGI on the traditional track

UNAM is perhaps the first traditional medical school to redirect its entire curriculum toward a path of major educational innovation. The innovative curricular redesign which was based on a detailed analysis of the nation's social and health care needs, and which characterized the planning for the A-36 track, has now been applied to our much larger traditional track. As with A-36, the planners of the new curriculum for the traditional track expressed a willingness to break down many of the barriers that have existed between different scientific disciplines, and between the classroom and the community.

Now all entering medical students at UNAM enter one of two tracks, both of which are innovative. Because the first students entered the newer track in 1985, this track is referred to as "Plan 85". It features the following innovations:

1. Integrated learning across scientific disciplines.
2. Learning in small, tutorial groups.
3. Community experiences introduced early and sustained throughout the curriculum.
4. A linkage between classroom studies and relevant community experiences.
5. A curriculum designed to meet learning objectives.
6. A fifth year (internship) which requires three-months community experience.

How did this major change come about? The key motivating force was the dean of the faculty of medicine. He initiated an intensive, broad, educational evaluation of both PMGI and the traditional track. In addition, he developed a profile of the ideal UNAM medical school graduate by soliciting input from a very broad base the faculty, the students, the private sector, and the community. He and his fellow planners then constructed a curriculum plan which utilized the best educational aspects of the two existing tracks, and which was designed to produce graduates with ideal characteristics. The strategy of broad sampling also served to build a consensus for change, and to ensure that the change reflected a rich diversity of ideas.

It is impossible to say which features of A-36 directly influenced the changes brought about in Plan 85. It is probably more important to recognize that major change can occur in an environment that facilitates such change. And changes create reverberations in every

other part of the curriculum. The form that the next innovation takes reflects, in turn, new pressures and insights.

Since A-36 preceeded many of the other community-oriented medical education models from around the world, it didn't have their accumulated experience to learn from. At its inception it hadn't the support of the later Alma Ata Declaration, or of the current national Mexican sentiment which so forcefully promotes primary health care. Plan 85 evolved at a different time, and was thus able to draw on broader experience – including that of A-36 – and could build on a broader base of support. And that is the reality of curriculum reform – it occurs in stages and it responds to the forces of the day. Successful innovators will continue to learn from past experience but to respond to the influence of new realities.

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CANADA
Upper Peninsula
UNITED STATES
Lansing, Michigan
MEXICO
Kilometers 0 400
Statute miles 0 400

Michigan State University, USA

The upper peninsula medical education program and the problem-based preclinical alternative

Nancy K. Brazeau, John W. Jones, John M. Hickner, and Jack L. Vantassel

Introduction

After several years of discussion and planning, the College of Human Medicine (CHM) at Michigan State University became a reality in 1964 with the appointment of Dr. Andrew Hunt as Dean. Prior to recruiting any clinical faculty, curriculum planning began, based on the following goals related to medical education.

1. A milieu should be established in which innovations in teaching methods are expected, and changes are under constant reexamination.
2. Education should produce physicians whose practice will be as rationally and scientifically based as possible.
3. Each student's program should be individualized, as far as possible, with respect to content and time span.
4. The skills of both self-directed education and self-evaluation should be constantly emphasized.
5. Explicit attention should be given to learning of both content and process.
6. Explicit performance objectives should be developed for all components of the curriculum.
7. Explicit attention should be given to the affective components of professionalization.
8. It should be recognized that behavioral and social sciences are of equal importance to the biological sciences.
9. Clinical education will be conducted in community hospitals.

The preclinical program began, with 27 students, in 1968—slightly ahead of schedule, due, in part, to the Federal push nationally, to generate more physicians annually. In the same year, approval for a full four-year program was received, and planning for a degree-granting curriculum began. This program, which became Track I, was implemented during the 1972-73 academic year. Track I had been in place only one year when the alternative, problem-based

curriculum, Track II, was introduced. One year later this was followed by the initiation of the Upper Peninsula Medical Education Program (UPMEP) which trained students in a primarily rural area of Michigan. Thus, in considering the CHM curricula, it is necessary to keep in mind that all three programs were implemented in the short time span of two years.

The clinical curriculum for the last two years of Track I and Track II, other than being located in five different communities, has followed the classic, required-elective, clerkship model, and will not be dealt with in detail. However, the UPMEP clinical program is somewhat different, as explained below.

Principle characteristics of the parallel and traditional programs

An overview of the curriculum (Fig. 4)

The curriculum of Michigan State University's College of Human Medicine (CHM) is comprised of three phases. Phase I is a one-term (ten-week) introductory overview of medicine, emphasizing the interrelationship of its biological, psychological, social, and clinical components. During Phase I, students attend biological and basic science courses in the lecture/laboratory format, and study medical problem-solving in small groups.

At the conclusion of Phase I, students select one of two alternative preclinical curricula as their mode of completing the five terms of study of biological and behavioral science content: the "traditional" curriculum, Track I; or the problem-based curriculum, Track II. During these five terms of Phase II, clinical skills are taught to all students, regardless of track choice, in a sequence of courses called Clinical Science which occupy two or three hours a week. Students in both tracks also study gross anatomy together, meeting for two hours of lecture and three hours of laboratory work each week during the first two terms of Phase II. Phase II is complete when students pass Part I of the examination of the National Board of Medical Examiners (NBME-I).

Students from both tracks enter the same clinical clerkship program, called Phase III. This phase begins with a four-week course, Clinical Medicine in the Community (CMC) which is followed by 48 weeks of standard required clerkships, 24 weeks of electives, and an integrated half-day-a-week experience in ambulatory care, spread over a period of 34 weeks. Phase III is

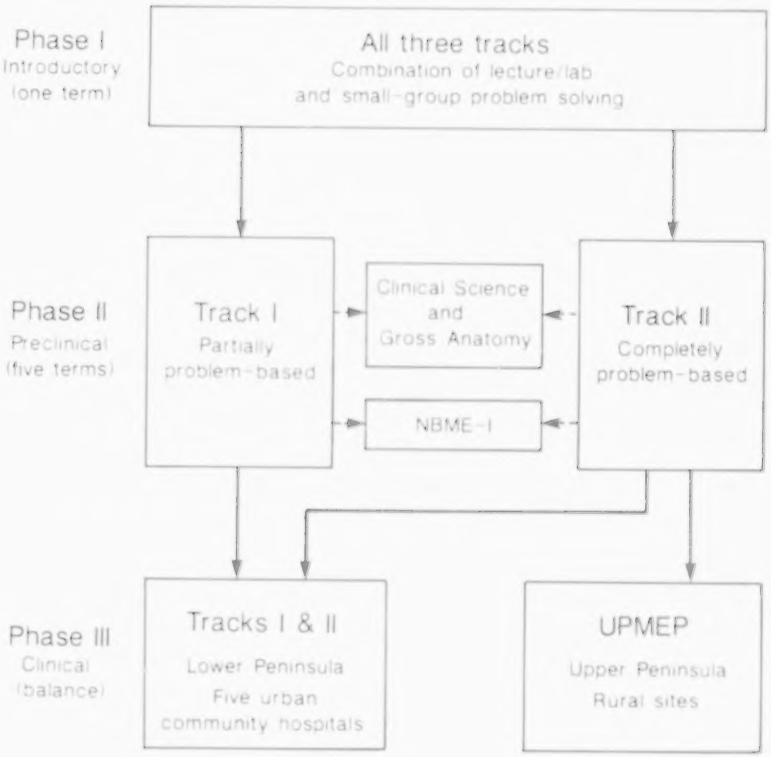

Fig. 4. An overview of the curriculum

conducted in community hospitals in five urban areas in the Lower Peninsula of the state. The populations in these communities range from about 80,000 to 200,000.

The UPMEP combines use of the Track II curriculum during Phase II, with a modified Phase III program conducted in Michigan's very rural Upper Peninsula.

Track I: The "traditional" track

In Track I, biological and behavioral/social science material is presented in a series of discipline-based lecture and laboratory

courses. Some clinical information is presented in courses dealing with human development, aging, radiology, and psychiatry. A modified focal problem format occupies a small segment of the Track I curriculum.

When Track I was first introduced in 1973, the focal problems occupied about one third of the curriculum hours, and served as bases for self-directed learning of some of the biological science content of the curriculum, as well as for small-group problem-solving. (See references 6 and 7 for more detailed descriptions of the Track I focal problem courses.) Gradually, the focal problem courses diminished in emphasis as the biological sciences courses expanded. In 1980, with a significant revamping of Track I, which included further expansion of the biological science courses, the remaining focal problems became directed primarily at the decision analysis approach to clinical problem solving and ethical decision making.

Track I has therefore become primarily a rather traditionally taught preclinical curriculum. Learning in Track I is evaluated primarily through a series of coordinated course-content examinations. Limited problem-solving evaluations are also components of the focal-problem course evaluations.

Track II: The problem-based curriculum

Track II, the innovative curriculum of CHM, is based on the study of "focal problems," which are comprehensive learning modules based on patient cases. Students are presented with medical problems, such as anemia, chest pain, or jaundice. They examine these problems from a broad range of perspectives, including the biological and behavioral sciences, mechanisms of disease, diagnostic and therapeutic issues, medical problem-solving, health care delivery and interpersonal encounters between physicians and patients and their families.

Learning in Track II combines self-directed study and small-group discussions. Referenced lists of basic concepts for each focal problem assist the students in covering the required content. Small groups of six to ten students meet with faculty preceptors twice weekly for two to three hours to discuss focal problem patient cases. Each session focuses primarily on the understanding of problems presented in the patient cases, through the application of content learned through self-directed study. These small-group sessions are

student-centered. There have been a few attempts by faculty to take over groups but these have never lasted long, with the students quickly regaining control.

Each focal-problem group is assigned two faculty preceptors - a clinician and a basic scientist from the biological and/or behavioral-social science disciplines. In addition to teaching and facilitating group sessions, preceptors participate in student evaluation and curriculum development.

Components of student evaluation include an objective content examination upon completion of each of the 14 focal problems, problem-solving evaluations once or twice each term, and narrative evaluations, by both the preceptors and the individual students once each term.

Track II was implemented in 1974 with an initial class of nineteen students. Approximately 33% of the students in each class of 100 students have chosen this track (with the exception of two years when the figure was 50%). (See references 1 and 8 for a more detailed description of the Track II curriculum.)

A comparative study of the entry characteristics of students selecting the two tracks is planned but not completed. We do know that a higher percentage of women than men in each class select Track II, and that these students are on average, about one year older than their Track I colleagues. Students entering either track may elect to transfer to the other, during or at the end of the first term, but not beyond that point. Only a few students have made such moves. A few students, who have been unable to meet the Track II objectives, have been allowed to restart Phase II in the more traditional Track I program, but the reverse has never occurred. (See reference 8 for more details about the selection and transfer issue.)

UPMEP: The alternative clinical program

The Upper Peninsula Medical Education Program is a clinical curriculum that was established to address the physician shortage in the rural Upper Peninsula of the state. Students who are accepted to the program (through a separate admission process) express an interest in practicing in rural areas, and are trained in this environment so that their training accurately reflects what their practice experience will be.

Prior to commencing their UPMEP studies, students complete two years of preclinical studies, Phases I and II, on the CHM

campus. For Phase II they are required to enroll in Track II because program faculty and administrators feel that the goals of the small-group, problem-solving curriculum are especially appropriate for people who will be learning, and eventually practicing, in remote areas. Originally, from 1975, when students first entered the UPMEP, until 1980, ten students entered in alternate years, and they completed Phase II on site in the Upper Peninsula. Due to accreditation concerns, however, the UPMEP students have, since 1980, completed Phases I and II on the main campus, in East Lansing, along with the other Track II students. Simultaneously with this shift, it was decided to admit six students every year in order to maintain a more continuous program in the Upper Peninsula.

Although there are no required community-oriented medical experiences while the students study on campus during Phases I and II, students who will later be in the UPMEP are strongly encouraged to spend one-half day every other week in offices of local family physicians during Phase II. After completing the second year of Phase II these students also take the NBME-I, and, if successful, begin their clinical studies (Phase III) in the Upper Peninsula communities of Escanaba and Marquette.

In the UPMEP, students begin Phase III with the four-week, introductory course, Clinical Medicine in the Community (CMC), similar to that taken by the Lower Peninsula CHM students. The remainder of Phase III, however, is quite different in the UPMEP. The introductory four weeks is followed by the six-month Comprehensive Care Clerkship (CCC).

The CCC is a unique, multidisciplinary, ambulatory-based clerkship combining elements of internal medicine, pediatrics, obstetrics gynecology, psychiatry, and behavioral science. A two-month family-practice experience serves to integrate these disciplines. The original CCC was designed to reflect the real world of family practice, giving the students exposure to longitudinal patient-care during their three and a half years of training in the Upper Peninsula. A core family-practice-office experience was supplemented by specialist teaching as patient-care demanded. For example, a student who examined a child with suspected appendicitis, would go with the patient to the surgical consultation and on to the operating room to assist.

This real-life model was flawed, however, as students found that they had too many competing time demands, and instructors had a

difficult time keeping track of their students. In addition, clinical departments were not comfortable with the idea that students were being trained clinically with little departmental control over content or time committed to teaching. Consequently, this portion of the program was modified.

Presently, the CCC is approximately 60 % ambulatory-based and 40 % hospital-based, with students completing two months of obstetrics/gynecology, one month of internal medicine, one month of pediatrics, and two months of general family practice. Psychiatry and behavioral science are integrated across all disciplines. Students work on a one-to-one basis with faculty preceptors recruited from the local community, and are given as much responsibility as they are capable of accepting. Excellent behavioral science training has prepared them to deal effectively with the many psychosocial issues confronting primary care physicians. The CCC takes place in Escanaba, a rural town of 15,000 in a county of 40,000. The Bay de Noc Family Health Center, staffed by two family physicians, a pediatrician, and a physician assistant, is the main site for ambulatory-care training.

Upon completion of the CCC, students move to Marquette, Michigan, a small city of 26,000 in a county of 90,000, where they take traditional clerkships at a large, regional medical center with 300 beds. This inpatient experience includes twelve weeks of surgery, twelve weeks of internal medicine subspecialties, and four weeks of psychiatry. The presence of the Marquette Family Practice Residency gives students an opportunity to work with residents, without interfering with the students' normal one-to-one working relationship with preceptors. Because students study in two communities, they are able to participate in two very different medical environments, the more rural primary care setting of Escanaba, and the secondary-care medical center in Marquette.

Rationale, motivations and major incentives for problem-based learning, the parallel track (Track II), and the UPMEP

Problem-based learning

As planning for the CHM curriculum evolved, the notion that the physician's "decision-making process" would be an appropriate focus for student education was proposed. As the first problem-solving courses were developed in 1968, the curriculum committee

offered the following rationales for this approach to medical education.

1. Problem-solving is the modus operandi in the medical profession, no matter what role an individual occupies. It seems, therefore, appropriate to give explicit attention to the development of these skills.
2. The educational principle that the learning setting should approximate the setting in which the material learned will be used, is best applied by the use of a problem-solving format. This is because the problems used can simulate real situations which closely approximate the circumstance encountered daily by the physician in caring for patients.
3. The problem-solving mode, if appropriately utilized, provides optimal circumstances for the basic science disciplines to enter into the clinically-oriented curriculum in a highly relevant manner.
4. Observation and evaluation of the students' performances in problem-solving, provides an opportunity to assess realistically their abilities to perform the kind of task which will be required of them in their professional roles.
5. The format provides ample opportunity to the student for modification of objectives, self-directed learning, and self-evaluation.

The small-group learning format was chosen on the basis that it would provide opportunities for peer teaching, peer evaluation, improvement in skills of communication, and experiences with team problem-solving. An additional underlying motivation was the desire to make learning more relevant to future clinical work, and thus, more exciting for the students. Also, it was considered that training in self-directed learning would enhance continuing education efforts in the future.

Parallel track (Track II)

The initial implementation of the problem-solving courses, and their early development, were carried out in a basically traditional curriculum, with lecture courses in the biological sciences predominating. But curriculum planners saw this as a temporary situation and had plans for the ultimate use of the problem-solving technique as the major integrating methodology of the curriculum. As will be described in the next section, the 1968 charge from Dean

Hunt to the curriculum committee to develop a four-year curriculum to replace the then two-year preclinical program, opened the way to further development of the problem-based component. The decision was ultimately made to expand the focal problems but not to go to a completely problem-based model. But a group of students entering this new curriculum in 1972, pushed very hard for further change, and this push was a key motivating factor in the decision to develop Track II as the completely problem-based alternative.

UPMEP

The concept of problem-based learning seemed to fit well with the ideas about educating students remote from the university, in the Upper Peninsula. Also, the need for a self-instructional curriculum that students could participate in, remote from the main campus, was an added incentive to the development of what became Track II. However, the major motivation for the development of the UPMEP was the physician shortage in that part of the state.

In the early 1970s, a group of Upper Peninsula community leaders and health professionals began to meet under the auspices of the region-wide Health Planning Association, to look for solutions for the serious problem of a diminishing number of physicians practicing in the region. Normal channels of physician recruitment had not been particularly effective in the past, and those recruitment efforts that were successful resulted in developing only a specialty and subspecialty base.

The Upper Peninsula of Michigan is located about 600 kilometers north of the major economic, industrial, and population centers of the state. It has a population of 330,000 – the largest city, Marquette, having a population of 26,000. The four other cities in the Upper Peninsula have populations in the 13,000-16,000 range, the remainder of the people being widely dispersed through the region in small towns, villages, and rural areas.

Economically, the Upper Peninsula is a depressed region with unemployment averaging 14% and reaching as high as 20% in some areas. In 1970, there were no medical education programs available in the Upper Peninsula; therefore, there were no established linkages with any of the four medical schools within the state.

In 1970, Michigan State University published a monograph on community-based medical education, written by Donald W. Weston, et al. The monograph described a new and innovative

model of community-based medical education that would, along with other agencies and institutions, assume a responsibility for the health services of a region served by the model.

In order to meet this goal of medical education's direct involvement in community health services, a model was designed to go beyond the goal of educating hospital-based scientists/physicians. The graduates of this model must also be both responsive and responsible to the communities they would serve.

Dr. Weston, then Associate Dean for Community and Clinical Affairs for the College of Human Medicine, began looking for potential sites for the development and implementation of his community-based medical education concepts, with particular attention given to the rural model. Simultaneously, a group of concerned Upper Peninsula citizens, attempting to recruit doctors for their region, decided to contact the source of doctors, namely medical schools in the State of Michigan and neighboring Wisconsin. During early discussions with administrators of the College of Human Medicine, it became apparent that here were the ingredients for a potentially successful joint endeavor between a major university and a community.

The Upper Peninsula constituency readily accepted the rationale for choosing medical education as a means of improving access to medical care, particularly when the education site would be in the community to be served. This geographical aspect of the rationale would have several effects: 1) Doctors tend to locate their practices where they receive their training; 2) the existence of medical educational opportunities tends to reduce professional isolation, and can be an important factor in the recruitment and retention of community doctors as faculty and practitioners; and 3) medical education programs can have a positive influence upon improving health-care delivery systems and referral patterns, within the surrounding community.

How problem-based learning, Track II, and the UPMEP were initiated and developed

Problem-based learning (Track I)

In 1968, in anticipation of the shift from a two-year to a four-year program, Dean Hunt sent a charge to the Curriculum Committee to begin planning a single, four-year curriculum for all CHM students.

He told the committee that they were not necessarily committed to the use of departmental core courses in the traditional basic sciences.

As the complete, four-year, Track I curriculum was being planned, the question of what roles problem-solving and the focal-problem courses should play was discussed extensively. Three options were considered: 1) Leave the focal problems at the current level, with the major, but not total, focus on problem-solving. 2) Expand focal problems as a technique to learn all of the basic biological and social sciences required. 3) Expand focal problems to some undefined point between these two extremes.

Some faculty were very much in favor of the second option, but several drawbacks were identified. There was some concern about adequate support from faculty, particularly from the basic science faculty, who might see this as a threat to their very existence. If it was perceived that medical students could teach themselves the basic sciences, it would be difficult to justify faculty positions in the departments. In addition, this move would establish a single new curriculum, thus not allowing for variability in learning styles. Since admission criteria were not primarily focused at selecting students who might perform optimally this more independent, self-directed style of learning, the college might be setting up some students to fail. Ultimately, the partially expanded focal-problem model was selected, with the option later to develop a completely problem-based curriculum.

Track II

In 1972, the Curriculum Committee distributed to the faculty of CHM a report on Phase II, which stated that "the proposed Phase II program represents an amalgam of many different strands, old and new." (5) This proposal, which was accepted by the faculty, was essentially a compromise between a totally problem-based, integrated program and a discipline-based program with some ancillary focal problems.

When the new curriculum was introduced during the 1972-73 academic year, focal problems had become the central learning vehicle in the first ten weeks (Phase I), and occupied about one-third of the students' time throughout the five terms of Phase II.

During the spring of 1973 a group of 13 first-year students went to the Dean with a petition strongly requesting permission to complete the rest of Phase II strictly through focal problems. This

approach was viewed favorably by Dean Hunt, since it supported his and other faculty members' ideas of how the curriculum should be organized. Without attending most classes, and working in small groups, the 13 students studied the content of the second term of Phase II (spring term, 1973). During the summer of 1973 a special expanded set of focal problems was developed for the last three terms of Phase II for this class. The original 13 were joined by an additional 14 students who, in small groups, completed Phase II in this program.

Largely as a result of the efforts of this same group of 13 students, the Curriculum Committee approved the creation of a subcommittee to plan a completely problem-based, parallel curriculum Track II. The understanding was that students in both tracks would meet the same content objectives.

In February 1974, a progress report from the Track II Committee was presented to the Curriculum Committee which, in turn, approved the preliminary plans and recommended that the experiment continue by allowing first year students to beginTrack II in the spring term of 1974.

When that time arrived, 19 students entered Track II, although the program was still being planned and was far from complete. During the ensuing months, until the program was complete, materials which were being developed were being used almost simultaneously, and at times the students got ahead of the developers and had to wait a few days for learning materials to be made available.

UPMEP

The Upper Peninsula became an important experimental laboratory to test the feasibility of conducting the preclinical phase Phase II in a rural area.

In January 1974, the Upper Peninsula Health Education Corporation (UPHEC) was formed to work with CHM to develop and implement the UPMEP. Operational funding for the Program came in July 1974 with a line-item appropriation from the state legislature to the CHM, and another to UPHEC. In October 1974 the UPHEC leased teaching clinic-space in Escanaba, and the first group of Upper Peninsula students arrived in January 1975 after completing Phase I on the East Lansing campus.

The major barriers faced by the CHM and UPHEC in the implementation of the Program related to the availability of

resources, both human and financial. The human resource issue was compounded by the educational model, that depended greatly upon a significant community voluntary faculty base. Since the region was medically underserved, and the community physicians had little or no experience in academic medicine, there was no experienced faculty base similar to that available in the other community campuses, in the Lower Peninsula. Even though basic and behavioral scientists were available in the colleges and universitites of the Upper Peninsula, they also had little or no experience in teaching medical students, as their educational programs were limited to premedical and allied health education.

Faculty recruitment and development were extremely important during the planning stages of the Program. Educational site locations were strongly influenced by the availability of adequate numbers of willing community faculty. Even though fulltime faculty were successfully recruited, significant numbers of voluntary faculty were necessary to make the Program cost-effective. Since the curricular concepts being developed on the main campus would need to be implemented by this new faculty in the Upper Peninsula, their first exposure was as members of curriculum subcommittees. Their task was to determine how the curriculum could be implemented in a rural setting. This activity brought fulltime faculty and community faculty together with the academic planners of the College. Subsequent formal faculty development retreats were conducted by CHM in the Upper Peninsula.

Basic and behavioral science faculty from local Upper Peninsula colleges were hired part-time to teach focal problems in conjunction with the clinical faculty. Both basic scientists and clinicians in the Upper Peninsula enthusiastically supported the focal problem curriculum. Besides the intellectual challenge, teachers were given faculty appointments at CHM, and those who served as coordinators in their respective disciplines were paid for their time.

Another human-resource problem related to the kind of medical student that should be admitted to the Program. Historically, premedical students from the Upper Peninsula and other rural areas stood little chance of gaining acceptance to most of the country's medical schools. Since one goal was to increase the opportunities for Upper Peninsula students to attend medical school, which it was believed would enhance the chance of their returning to the region to practice, a unique admissions procedure was developed. Unlike the other community campuses, the medical students for the

UPMEP are recommended by a subcommittee of the CHM admissions committee, made up of a broad representation of the Upper Peninsula community. Criteria for admissions differ from the more traditional programs, as greater emphasis is placed upon noncognitive characteristics of the UPMEP applicants. These characteristics include community of origin; ties to the region, such as attending undergraduate school in the Upper Peninsula; a concern for the health needs of the Upper Peninsula; and a commitment to primary care; as well as academic ability.

Social, Economic and Political Forces Supporting and Resisting Change

The explosive growth of Michigan State University after World War II generated antagonism within some groups in the state, especially at some of the other major educational institutions which perceived these developments as a threat. Later, the idea of creating a medical school at MSU met the same kind of initial opposition. During the first two or three years of consideration by the state legislature, that body was fundamentally hostile. Opposition generally reflected the following attitudes:

1. The medical schools of the MSU and Wayne State University needed funding for their commitment to expand medical education, and guarantees of funding should be obtained before a new program is established at MSU.
2. MSU had grown too fast, and was exceeding its mandate by moving into the field of medicine; such an effort would be unlikely to succeed in a "cow college."
3. Clinical resources in the East Lansing area were quite possibly inadequate to support a full medical program; Detroit or Grand Rapids would be more appropriate sites for a third medical school, when such an institution was called for.
4. Even though a 1962 resolution of the Michigan legislature permitted MSU to proceed with a "two-year program in human biology leading to the M.D. degree," it was generally felt that the university was planning for a college without an appropriate mandate from the political body.(3)

On the positive side, it was argued that CHM would keep costs down through the use of established biological science departments as well as by using community hospitals for clinical training. The use of community hospitals and an emphasis on primary care would be

innovations that would train students in a more realistic setting than that found in the tertiary-care university hospital, and might thus result in a better distribution of primary-care physicians in the state. The thrust would be to train humane problem-solvers who would be better self-directed learners during their practice years.

As the public began to understand the fundamental differences between the proposed College of Human Medicine and other Michigan medical schools, resistance gradually diminished. MSU's mission as a land grant institution, created to "serve the people" was congruent with the idea of a community-oriented medical school.

Within the university and CHM, there were various forces supporting and resisting the relatively new ideas about medical education which were being considered by the leaders of the medical school. Implementing an innovative curriculum change at a new school with faculty chosen to work with such a system would, in theory, be relatively free of resistance. However, the CHM was created with the understanding that it would draw faculty support from already existing university departments.

When the CHM was created, the basic science departments at MSU were already responsible for teaching in the Schools of Veterinary Medicine, Nursing, and Agriculture, as well as in other undergraduate and graduate programs. There was resistance to the notion of creating another college in which basic science faculty would be required to teach, further stretching the already stressed faculty resources. This resistance was later compounded by CHM's commitment to teaching the basic sciences in an interdisciplinary way. Few basic science faculty were confident of their ability to teach in a small-group, interdisciplinary setting in which they would be considered experts in areas outside their specializations.

In contrast to the already existing basic science departments, the CHM's clinical departments all had to be developed de novo. Initially, faculty recruited to the clinical departments were, by and large, interested in innovation in medical education and were excited about participating in a new school. However, by the time Track II was organized, several changes had occurred that affected clinical faculty input to the "preclinical" program. First, due to federal pressure to expand class size, this class had increased from a planned size of 64, to 88 students. Clinical faculty growth had lagged behind the rate of student growth. Second, the parallel development of Tracks I and II left both programs with a less-than-adequate number of faculty to plan and teach the problem-based components. Third,

in 1970 it was decided by the legislature that CHM would become a four-year medical school. This required the already-stretched clinical faculty to turn their attention to planning clerkships and to teaching them in three communities. As a result of these various events, faculty support for the preclinical integrated programs diminished significantly.

As the Track II curriculum was being established, and after it had been implemented, there was much discussion among the faculty about the appropriateness of training medical students using an interdisciplinary curriculum. Many traditionally-trained faculty felt that "the students won't learn unless lectured to".

The educational soundness of Track II was also an issue outside the college. Because of a number of new curriculum components introduced before Track II began, the Liaison Committee on Medical Education (LCME) in 1970 urged CHM to require the students to take NBME-I, and repeated this request on several occasions subsequent to the implementation of the new curriculum. Many of the faculty, as well as Dean Hunt, were opposed to imposing this external evaluation, which, by its discipline-based nature, was not consonant with the problem-based educational objectives of either track or of the UPMEP.

When the LCME returned for an accreditation visit in 1980, the National Board issue was its paramount concern. After the LCME report was received, Dean Weston concluded that the CHM must institute the Board examination, and NBME-I was adopted as a requirement in 1982.

UPMEP

The UPHEC was instrumental in gaining political support for the UPMEP in the Upper Peninsula, and from the Michigan legislature. Area physicians, educators, and community leaders were exposed to the idea and convinced of its viability by Corporation personnel. Dean Weston's skill at pulling together a coalition was a critical factor in the creation of the Program.

Since the operational costs of the Program would be funded through the higher education budget of the state of Michigan, there was considerable opposition by educational institutions purely on the basis of competition for scarce financial resources. State legislators from the Upper Peninsula, who historically have had considerable political power in relation to the population they

represent, were very much in favor of establishing the Program. The initial support of the Governor's office was also crucial to success.

There was both strong support and opposition within the CHM to the creation of the UPMEP. Many traditionally trained faculty, and especially those in the basic science departments, were not convinced that medical students could be taught in an "intellectually impoverished" place. The clinical faculty at CHM were concerned about the quality of the clinical teaching that would be available to students in the Upper Peninsula.

The existence of a rurally based medical education program was dependent upon a nontraditional approach to teaching basic sciences, since a traditional approach would be prohibitively expensive to establish in a remote area. Thus, the development of Track II was an essential ingredient in the creation of the UPMEP.

The LCME has had a profound influence on the program. When the LCME reviewed the CHM in the early 1970s, it made a recommendation that the college work to strengthen its five existing community campuses (Flint, Saginaw, Grand Rapids, Lansing, Kalamazoo) before creating new ones. This recommendation did not deter CHM administrators, because commitments of federal and state funding had already been made to Upper Peninsula legislators who were intent on developing the UPMEP. When the LCME returned for its accreditation visits in 1978 and 1980, and reviewed the UPMEP, they still had a lingering negative sentiment toward the program. The LCME was not convinced that medical students could be trained effectively in an area so remote from the main campus. Major objections included the lack of depth in faculty, especially in the basic sciences, and the lack of a truly academic environment. Consequently, as a result of the 1980 LCME visit, CHM required that students complete their first two years of study on the main campus in East Lansing. Phase II of UPMEP was moved to the Lower Peninsula.

Some CHM administrators have concluded that the real issue during the 1980 LCME accreditation review was not that students were being trained in the Upper Peninsula, but that the college would not require its students to take the examinations of the NBME. The National Board issue had come up in the first accreditation review in the early 1970s, and the LCME had recommended then that CHM require the examinations. CHM did not comply, and the issue was paramount during the second visit. The compromise that resulted – adoption of the NBME-I, changed

the UPMEP and forced CHM to move slightly closer to a more traditional medical school structure.

Strategies developed to overcome barriers to change and to develop support forces

The concepts of small-group, integrated, problem-based learning were new to many faculty, whose main experiences with teaching of medical students had been in the lecture/laboratory format. In order to get the faculty involved in an active way, three faculty retreats were held away from the campus.

These retreats were helpful in increasing faculty understanding and willingness to experiment. The faculty were not all convinced that these ideas would work, but most were willing to give them a try. The development of the early focal problems involved multiple faculty from a variety of disciplines, which allowed for first-hand experience.

In 1973, when the Curriculum Committee approved the proposal for a completely problem-based track, before the new curriculum (Track II) had been completed, a number of faculty became upset. Some felt that the Dean's office was over-reacting to student demands, and not thoughtfully making changes after proper faculty deliberation. Others were concerned about manpower issues. Some continued to believe that students would learn only if forced to do so, and that this was only likely to occur in a lecture format. By 1977, four years after the first students entered Track II, it was felt by the administration, and some of the faculty, that proper approval of the track was necessary if it were to survive.

A new Track II chairperson met with all department chairpersons, confirmed their commitment to appoint representatives to the Track II Committee, and assured them that their input to the program would be considered. This did much to assuage the faculty's concerns about control over content and evaluation. The idea that the objectives for both Tracks were identical was reaffirmed. With these changes in program structure, the Track II curriculum was presented to, and approved by, the faculty of the college in 1978.

Students were also essential to the process of change. When the group of 13 students presented their desire for a problem-based curriculum in 1973, sympathetic faculty encouraged the students to push the administration and the Curriculum Committee. Partly as a

result of this push, Track II was developed. The more important roles of the students, however, were in the actual development of the initial learning materials, and in the ongoing review and revision of these materials. Students were hired as graduate assistants to work with the Track II Committee in developing the learning cases, reference lists, and even evaluation items. Without the students' hard work, the over-committed faculty would never have been able to get Track II going in such a short time frame.

Compromise was also a significant strategy in developing and maintaining Track II. Two such compromises were the agreements that the content would be the same in both tracks, and that evaluations would emphasize objective examinations. In addition, the concept lists for each of the focal problems were broken down by discipline to allow the departments to see what content from their disciplines was being studied. Some of these compromises, however, have been detrimental to the original ideas of problem-based learning. Patient care has lost its central role as a stimulus for learning, having been replaced by the concept list. The discovery method of learning has declined, as the faculty has defined the content to be learned in more and more detail. Student-directed learning has lost out.

UPMEP

The use of the same Track II learning materials and evaluations in the Upper Peninsula as on the main campus was the primary means by which the basic science faculty had maintained control over the content of the Upper Peninsula program. And with the shift of the Upper Peninsula students to the main campus for Phase II, and the approval of the Track II curriculum, this area of concern about UPMEP students not learning enough has all but vanished.

The departmental concerns about the quality of clinical teaching in the Upper Peninsula has been lessened by having the teaching under the direct control of the on-campus departments, as it is in the affiliated communities in the Lower Peninsula. Upper Peninsula students, in Phase III, are required to take the same departmental examinations—in internal medicine, surgery, pediatrics, psychiatry, and obstetrics/gynecology—as the students on the other clinical campuses. Department chairpersons visit the Upper Peninsula campus frequently, and Upper Peninsula clerkship coordinators

travel to the main campus, in East Lansing, to participate in department meetings.

The role of other institutions in helping to develop the parallel innovative track

In the late 1960s and early 1970s several members of the developing Faculty of Medicine at McMaster University spent time at CHM, as fellows in MSU's Office of Medical Research and Development; and several faculty and students from CHM visited the McMaster program. This allowed for considerable sharing of ideas.

The independent-study programs at Ohio State University, the University of Wisconsin, and the University of Illinois were investigated by CHM, but did not have a major impact on the development of the CHM problem-based curriculum.

As was discussed earlier, the UPMEP was based on a proposal initiated by Weston, et al., (11) without any significant influence from outside of the College.

The degree to which the innovative track has influenced the conventional track

The "traditional," partially problem-based Track I, the completely problem-based Track II, and the UPMEP were all developed in the same two-year period. Hence, there was much interaction between the three programs. The concept of problem-based learning was incorporated into all three curricula.

Track I has actually influenced Track II much more than Track II has influencedTrack I. In order to ensure the acceptance of Track II, it was necessary to agree that the content objectives would be the same as for Track I. This, unfortunately, resulted in undue emphasis on evaluating Track II students on the basis of content. Also, as content areas were added to the Track II curriculum, for example radiology and medical ethics, new materials had to be modified to accommodate these changes. During most of the first ten years of the parallel curricula, the Curriculum Committee spent most of its efforts in Track I and Phase I, and expected the Track II committee to make the required adjustments to their track.

Following faculty approval and acceptance of Track II in 1978, the biological science departments expanded their lecture courses,

and have thus further reduced the integrated focal problem teaching in Track I. Part of the rationale for this change was that students who chose Track I wanted lectures, not small-group learning. Thus the two curricula should be made more distinct. The changes in Track I focal problems since 1980 have brought the emphasis on problem-solving in Track I to a lower level than before their introduction in 1973, and basic science lecture time is at an all-time high. In the view of some, these changes represent a negative impact of Track II on Track I.

These interactions between the tracks also apply to the UPMEP as these students complete the same Track II program. The development of the community aspects of the UPMEP grew out of the College's commitment to community-based clinical education, and the administrative structure of the program followed the models developed in the other five affiliated communities, in the Lower Peninsula, involved in Phase III. The modified approach to Phase III, used in the UPMEP, has not resulted in any changes in Phase III in the other five communities.

Outcomes and future development

In their 1982 paper, Jones, et al., compared the performance of Track I and Track II students over a ten-year period. (8) The overall conclusion was that there was very little difference between them. This demonstrates that students who have selected, and studied in, the problem-based program, perform as well as those in the more traditional curriculum. This conclusion applies to performance within the first two years, including the NBME-I; it applies to clerkship performance in the content domain; and it applies to residency performance in the post-graduate years. There have been no attempts to determine whether or not the Track II graduates are better problem-solvers in the clinical setting, or whether they are better at self-directed, continuing education.

The career choice results were unexpected. A greater proportion of Track I students favored surgery and subspecialties, while the reverse was true for family practice, pediatrics, and psychiatry. These differences remain unexplained, but could reflect either the student characteristics that influenced track selection, or differences in the Phase II experiences within the two tracks. The former possibility is supported by the larger proportion of of students entering Track II who indicate a preference for family practice, as

well as the higher proportion of Track I students favoring surgery. If curriculum differences are also a significant factor in influencing student specialty choice, it appears that Track II favorably influences the choice of primary care specialties.

Has Track II been a success? The following "hard" and "soft" observations indicate that it has. (8)

1. Students are able to learn at least at a level equal to students in the more traditional program.
2. The stability of the number of students selecting Track II indicates that this option remains a viable one.
3. Most students are satisfied with the program as reflected by the facts that *a*) very few shift into Track I; and *b*) there is a high (purely anecdotal) "happiness quotient," especially when one compares student attitudes between the two tracks.
4. Most small-group preceptors find the experience of teaching in a group to be interesting, stimulating, and even exciting.
5. The concern, often verbalized by basic biological science faculty, about whether students are learning, or can learn, in this mode, has greatly diminished.

Currently there is some discussion, among the faculty and administrators, about creating a single curriculum that would combine the best aspects of both tracks. Running a single curriculum might be less costly in dollars and in faculty time. Some faculty are currently responsible for three different medical school curricula: the College of Osteopathic Medicine and Tracks I and II in the College of Human Medicine. One less would reduce the stress on limited resources.

Negative results of employing a one-track system would be the loss of any semblance of individualization, an original and basic goal of CHM, and the loss of a unique educational experience that CHM can call its own, Track II.

With encouragement from Dean Weston, another faculty retreat was held in 1984. As a result of this retreat, Dean Weston appointed a task force to formulate recommendations to design a new educational program for the College. The task force deliberated for nine months and developed a list of rationales for change, guiding principles for change and recommended a process to develop a new curriculum.

The rationales for change included the following:

1. The expansion of knowledge, which requires that students develop the skills of locating, evaluating, and using new information.
2. The need to provide the student with exposure to patients in a variety of new practice environments.
3. Dissatisfaction with components of the current curriculum, and with the piecemeal manner in which changes had been made in the past, without an overall plan.

In the fall of 1985 the task force recommendations were discussed at another faculty retreat and were accepted in principle. Since that time, Dean Weston has been approaching various foundations in search of funds to implement the core faculty concept.

UPMEP

Comparison of student performance on the various evaluations used in Track II have never revealed any significant differences between the UPMEP and East Lansing students. NBME-I scores also have not demonstrated any consistent differences between the two groups of students. A comparison of clinical department examination scores shows that the UPMEP students perform slightly above the average of their CHM peers.

In 1980, the UPMEP conducted a series of interviews with directors of each of the residencies attended by the first two classes of UPMEP students. The residency directors were asked to compare the performances of UPMEP graduates to those of residents from other medical schools. Results of the interviews suggested that the UPMEP students were better prepared in relating to patients, and had more highly developed clinical and procedural skills.

About 70% of the UPMEP graduates choose primary care specialties. About 40% of them have acted as chief residents during their residency tenures. Of the 28 who have completed their residencies, about 50% are currently practicing in rural areas in either Michigan or other parts of the country.

As a result of the LCME demand that students complete the first two years of their studies on the East Lansing campus, faculty and administrators of the UPMEP feel that the students are not in the Upper Peninsula long enough. Before the change was effected in 1980, Upper Peninsula students were able to work with patients throughout their four years of school, gaining valuable experience in

longitudinal patient-care. Faculty had more time to work with students on a one-to-one basis. Since the change, however, the students have much less time to spend with patients. The curriculum has become more traditional, with the students spending more time learning hospital medicine at Marquette General Hospital, and less in ambulatory care.

With its strong ambulatory base in Escanaba, the UPMEP is ideally situated to respond to the national trend away from hospital care. With twelve years experience in ambulatory training, the faculty is looking for even better ways of teaching students in an outpatient environment. The growing disciplines of primary care, internal medicine, pediatrics, and family practice are examining ways to coordinate and combine teaching and training activities.

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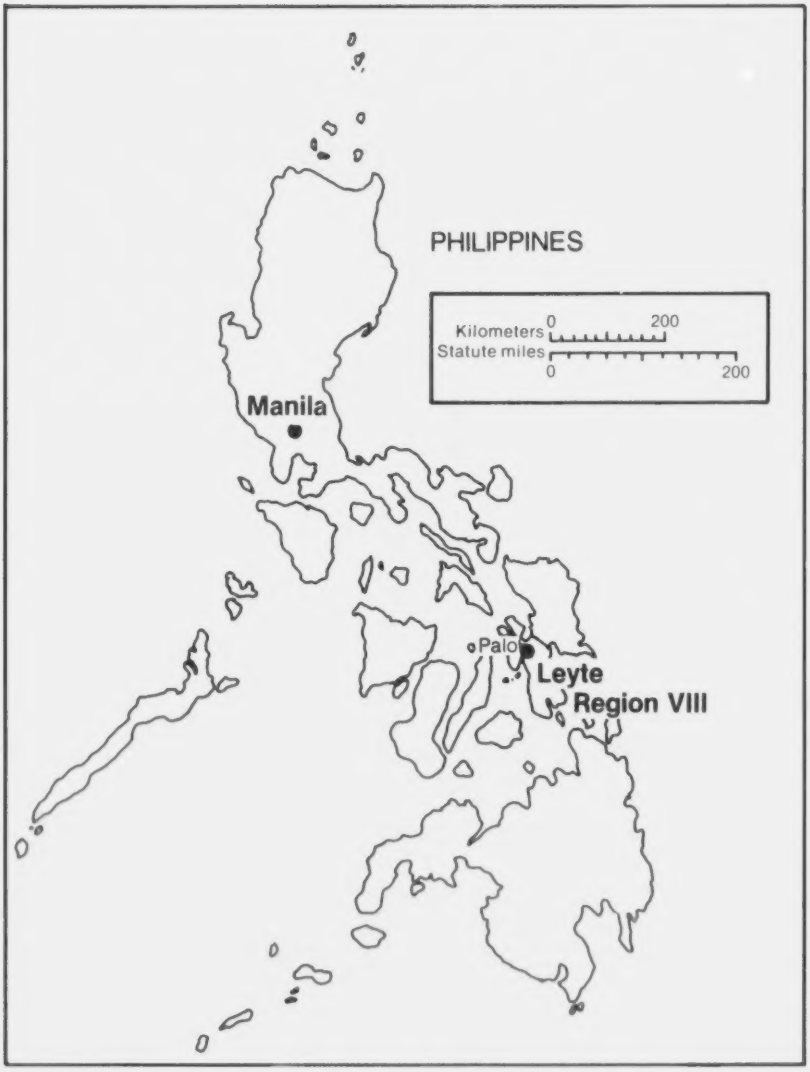
PHILIPPINES
Kilometers 0 200
Statute miles 0 200
Manila
Palo
Leyte
Region VIII

University of the Philippines, the Philippines

Elements in the institutionalization of the University of the Philippines Institute of Health Sciences at Palo, Leyte

Jusie Lydia Siega-Sur and Zenaida C. Varona

Introduction

The University of the Philippines - Institute of Health Sciences at Palo, Leyte, in Region VIII of the Philippines, is an experiment in medical education. It utilizes non-traditional approaches aimed toward the development of health professionals who will serve the rural communities of the country. The experiment includes a competency-based, community-oriented curriculum. This is in contrast to the subject-based, tertiary-care hospital-oriented curriculum which is based on Western models and sophisticated technology, and which is being implemented by all other medical schools in the country.

Overview of the program

Rationale and objectives

Confronted with the problems of the brain drain and the maldistribution of the health manpower in the country, the University of the Philippines - Institute of Health Sciences (UP-IHS) at Palo, Leyte, was established in 1976. It was a joint venture of the University of the Philippines System, the Ministry of Health (MOH), the Ministry of Local Government and Community Development (MLGCD), and the province of Leyte. The venture was an attempt to develop an alternative form of health personnel education which would overcome the existing problems of medical education and services within the Philippines, and which would address the needs of primary health care in the rural communities.

This experimental venture has two primary objectives:

1. To produce a broad range of health professionals who will serve the rural communities.

2. To design and test program models, for health manpower development, that will be replicable in various parts of the country, and in other countries with similar needs.

Academic program

The primary determinants for curriculum development, and for selection of teaching learning methods were these two guiding principles:

1. Learning was to take place not only in classrooms and in clinical and laboratory settings, but, more importantly, in the settings of future practice — the communities. Thus, while three days each week are spent learning theories and concepts in the classroom, the next three days are spent in communities and clinical settings to enable the students to apply their new knowledge to the actual work setting.
2. Teaching learning methods were also to accommodate and be supportive of the kind of students its democratized admissions brought to the Institute.

The main feature of the academic program is the stepladder curriculum. This integrates, into a continuous and unified curriculum, the training of the broad range of manpower from the Barangay (Village) Health Worker to the Doctor of Medicine. This stepladder arrangement allows the development of a multi-skilled health professional who may exit at any point of the curriculum, to serve his or her own community with abilities commensurate to the exit level.

The curriculum has five levels:

1. Barangay Health Worker (BHW)
2. Community Health Worker (CHW)
3. Community Health Nurse (CHN)
4. Bachelor of Science in Community Health (BSCH)
5. Doctor of Medicine (MD)

Completion of the first level, which runs for one quarter (eleven weeks), qualifies one for the Certificate in Barangay Health Work, and enables the worker to carry out such tasks as 1) treating common illnesses through first aid and emergency care, 2) assisting in the implementation of programs of nutrition, environmental sanitation, maternal and child health, and communicable disease control, and 3) assessing community needs.

Progression through the next level for another five quarters entitles one to the Certificate in Community Health Work, equivalent to the Graduate in Midwifery of traditional schools. A graduate of this level is eligible to take the government licensure examination for midwifery.

The third level, which offers a Certificate in Community Health Nursing, runs for another four quarters. At this level, the student gains additional skills, besides clinical nursing skills, that enables him or her to undertake epidemiological studies; design health education programs for the community; develop supervisory plans; engage in family health care; and plan, implement, monitor, and evaluate programs for community development. A graduate of this level is equivalent to the graduate of the Nursing programs of a traditional school, and is eligible to take the national licensure examination for nurses.

A student who progresses through the next level, comprising another two quarters, is awarded the degree of Bachelor of Science in Community Health. Envisioned as the local counterpart of the "nurse practitioner" abroad, a graduate of this level assumes the expanded role of the nurse, and certain functions traditionally belonging to the realm of the physician.

The last level of the curriculum consists of twenty quarters, and alternates between didactics and community and hospital practicum, and leads to the degree of Doctor of Medicine.

Because students are recruited from primarily depressed rural communities, and because the emphasis of UP-IHS is on service excellence rather than academic excellence, the incoming students are generally deficient in reading and writing, and also in oral English comprehension. In addition, they usually do not score highly on the National College Entrance Examinations. To help overcome these problems, a tutorial system is included as an integral part of the UP-IHS program.

Relevance of academic training to community needs is reinforced with field work, where abstract principles learned in the classroom are made concrete by field experience. For five weeks every quarter at the CHW level, eight and six consecutive weeks at the CHN and BSCH levels respectively, and for one full year and three academic quarters at the MD level, students spend their time in rural communities where they are exposed to the realities of community life. Here, they apply the principles, knowledge, and skills gained in the classroom, and develop competencies needed by them to

function as health and community development workers in their home communities. During this time, the students actually live in the communities in the homes of selected foster families, where they help in the activities of daily living and are treated just like any other member of the family. Weekly, supervisory visits are conducted by the faculty to assess the students' progress and to guide the students in the organization and implementation of their activities.

These faculty visits also provide an opportunity for the students to share insights gained from their experiences, while the faculty help them to integrate such insights into their learning.

The weekly supervisory visits are made primarily by faculty members with expertise in Public Health, Maternal and Child Health, Health Education, and Community Organization and Development. However, arrangements are also made so that all faculty members are able to supervise students in the community to enable the faculty to make classroom teaching more relevant to community life.

Between each level of the stepladder curriculum, the students go back to their home communities on service leaves.

If the student's home community is in need of a health worker with the competence level already attained, the student will remain permanently to serve the community. If the need, however, is for a higher competence level, the student returns to training after a service leave which generally lasts between three and six months. At times, however, re-entry to the next level is delayed by financial constraint, in which case the service leave can last as long as nine months.

These service leaves were designed to enable the students to mobilize further the knowledge, skills, and attitudes gained during training, and to apply them in the actual work situation. At the same time, this enables both the faculty and students to assess the relevance of instruction to the work situation. It is also hoped that the service leave will strengthen the bond that was established between the student and community during nomination of the student to the school. It is hoped that at the same time, a bond will be created between the community and the school, that will enrich the teaching learning process. And it is finally hoped that through the service leave, the student will grow deeper roots in the community, that these will help guarantee his or her return, and that these barangays will finally receive a level of health care previously unavailable.

Admissions program

The admissions requirements and policies of the Institute were built around the assumption that a person recruited from a depressed and underserved area, and who became trained in health and community organization skills would become a health worker committed to rural community service.

There is, among Filipinos, the cultural value known as "utang na loob." This value reflects deep gratitude for any act of kindness received, and, in turn, willingness to be of help when needed. "Utang na loob" can lead to loyalty and commitment to the community as a debt of gratitude that can never be fully paid.

It is around this cultural value that the "social contract" between the scholar and his sponsoring community revolves. It is hoped that having been endorsed by the community as a scholar, the latter shall go back to serve his community after completion of the course. Further, in the belief that "people support what they create," structures and procedures have been developed to generate community support through active involvement of the community in the selection process as well as in training.

Unlike traditional schools, where students apply on their own, students at the Institute are drawn from communities known to be badly in need of health workers. Identification of priority areas begins at the regional level, with the IHS Recruitment and Admissions Committee allocating slots to the various provinces according to need. In the provinces, target municipalities are identified by the Provincial Health Officer in coordination with the Provincial Development Officer. Finally, the Municipal Health Officer together with the Municipal Development Officer (MDO) identify the community from which the scholar is to be drawn. At the Barangay level, a Barangay Screening and Nominating Committee composed of the highest ranking official of the Rural Health Unit, the MDO, the Head Teacher, the Barangay Captain, and members of the community organizes and manages the selection of the scholar.

Selection is then made in an open meeting. To be selected, the nominee requires the support of at least 75% of the household heads. Upon nomination, the scholar enters into a "social contract" with the community to return to render service as a health worker. The community likewise pledges to provide the scholar with a measure of support (e.g. transportation, stipends, tuition, fees, etc.).

Through this mechanism, the client of the Institute, in a larger sense, is not the student, but it is the community that the student represents. Should the student prove disinclined to serve the home community, the community has the power to recommend that the student not be readmitted to the Institute.

Geographical setting

Crucial to the innovation was the geographical location of the academic portion of the training. The institute was to be located away from big urban centers, and, consequently, away from its mother unit, the UP College of Medicine, in Manila.

The Institute was first situated in Tacloban City, the capital of Leyte province, but not a large, urban center. In 1980, another campus was established at Palo, Leyte. To the Palo campus were moved the programs below the medical level of the stepladder curriculum. In the establishment of both campuses, UP-IHS drew support from the UP College of Medicine – distant only in miles.

Recruitment and preparation of faculty

Because the Institute is located away from urban centers, the faculty has had to be drawn from the local community practitioners. An important consideration in faculty recruitment at all levels of the curriculum is faculty commitment to the Institute's philosophy and, concomitantly, a willingness to take the attendant risks in the innovations. The faculty also must have an unfaltering willingness to support students in their learning difficulties, and an openness to change and criticism.

Perhaps, the basic enticement for the faculty to participate in the program is the idea of being able to participate in an innovative experiment. In addition, joining the ranks of the faculty of the most prestigious institution of higher learning in the Philippines is an added inducement. And aside from the prestige gained, the UP system offers a higher salary scale than others.

While at the Institute, the faculty are given an orientation on the concept, objectives, and mechanics of implementation of the stepladder curriculum. They also attend seminars on teaching and learning within the context of the curriculum. Staff development through formal graduate courses according to institutional needs, is also part of the faculty development scheme. But most important of

all, is allowing the faculty maximum exposure to the community to enable them to make classroom teaching more relevant to community life.

Table 2 shows recruitment data and progression through the various levels of the curriculum by the different batches. Relative to each program, are the columns BHW (level) admitted which indicates the number of scholars initially admitted at each level. Graduated indicates the number of scholars who completed the program, while Fielded refers to the scholars who after completing a certain level did not progress to the next level, but rather have remained in their communities to serve as health workers.

Elements in the institutionalization process

Rationale

The most crucial factor causing the maldistribution of health manpower in the Philippines is the type of acculturation Filipinos have gone through. Over the centuries, the Filipinos have introjected the values of colonizers. For many years, more recently, a steady stream of Filipinos has been trooping to the United States, later to return with a highly technological medical education. In time, physician competence was defined in terms of one's having gone abroad. No matter how irrelevant to the needs of the country, medical education in the Philippines itself became patterned largely after western models. This education, geared towards the illness of a few, in tertiary care, alienated the graduates from their own people. This training has left the graduates unable to cope with local problems of malnutrition, poor sanitation, population explosion, etc., which prevail in the rural communities where 70% of the Filipinos live; problems which are at the root of the major health problems of the country.

Discontent over this disturbing picture prompted a number of faculty members of the UP College of Medicine to attempt to develop a curriculum designed to meet the needs of the rural communities. The ideas of this group later so impressed then Dean Florentino Herrera, Jr., that he organized a committee to study the feasibility of opening a "non-traditional medical school in Leyte."

The multi-disciplinary committee consisted of six physicians with varied specialties including the basic sciences, one physician

Table 2. Progress of different batches of students through the curriculum

	BHW ADM	Graduated	Fielded	CHW ADM	Graduated	Fielded	CHN ADM	Graduated	Fielded	BSCH ADM	Graduated	Fielded	M.D. ADM	Graduated	Remarks
1st Batch 1976	–	–	–	96	96	47	49	49	29	20	20	8	12	12	
2nd Batch 1977	72	72	4	68	68	48	20	20	2	7[a] 18	25	12	13		
3rd Batch 1978	72	72	4	68	68	50	18	18	0	2[a] 18	20	16	4[a] 6		
4th Batch 1979	69	69	13	56	56	30	26	26	12	7[a] 14	21		4[a]		
5th Batch 1980	63	63	11	52	52	20	32	31	11	3[a] 20	23				
6th Batch 1981	59	59	15	44	44	16	28	28	4	24					
7th Batch 1982	80	80	19	61	61	33	1[a] 28	1[a] 28	3	25					
8th Batch 1983	79	79	24	55	52	21	1[a] 31								
9th Batch 1984	48	44	13	31											
Oth Batch 1985	49	48	4	37											

[a]Smaller numbers above are lateral entrants from previous batches.

specializing in public health, a philosopher, a social scientist, and a nurse specializing in public health.

Their deliberations and recommendations led, eventually, to the establishment of UP-IHS in Tacloban City in 1976.

Supporting factors

Global/national policies and directions

Perhaps by providence, the establishment of UP-IHS came at a time when the national commitment of the Ministry of Health was in line with the thrust of the World Health Organization policy directed to primary health care — to attain the goal of "Health for all by the year 2000." The alignment of UP-IHS in this direction was one of the major factors in the further development and acceptance of the program.

The Organizers

The organizers of the curriculum were renowned internationally as medical educators, and occupied positions of influence. These factors were of great importance in obtaining acceptance and final approval of the curriculum.

It was the Vice-President of the University himself, who presented the innovative curriculum before the Board of Regents.

Dean Herrera, as Dean of the UP College of Medicine, served also as a member of the Board of Medical Education, which "has the power to authorize the implementation of an experimental medical curriculum in a medical school that has exceptional faculty" and the capability of carrying out the experiment. This Board membership was of inestimable value in the implementation of the program.

The UP Factor

The University of the Philippines is a public institution of higher learning. Besides having the prestige and credibility of being the foremost institute of higher learning in the country, UP operates under its own charter. It therefore does not fall within the jurisdiction of the Ministry of Education, Culture and Sports (MECS), and is not bound to follow curricular standards set by MECS. This gives the University great flexibility in experimenting with new curricula and processes of learning.

Funding sources

Stirring global interest and concern, the program was initially funded through the research funds of the UP College of Medicine, gained from foreign sources. It was this external funding that had been instrumental in supporting the UP-IHS operations in its fledging years. In addition, there was projected at the local level an aura of international concern and commitment to the concept.

External funding sources included the following:

Nelly Kellog Van Schaick Charitable Trust Fund
United Nations Children's Fund (UNICEF)
World Health Organization (WHO)
Danish International Development Agency (DANIDA)
Swedish International Development Agency (SIDA)

Later, recognizing the possibility that external funding sources can withdraw support at any time, UP-IHS requested a regular allocation from the internal budget. Consequently, since 1981, funding for virtually the entire operation of UP-IHS comes from the Government of the Philippines. The home community of each student pays a minimal amount to the UP-IHS "Local Counterpart Fund". This fund was conceived as another strategy to reinforce the concept of a partnership between UP-IHS, the student, and the community.

Multi-sectoral linkages

With the conviction that medicine is also a social science, and that health is a concern not only of the medical fraternity, but of many groups, including the people themselves, UP-IHS was conceived and operated as an interagency and interdisciplinary project. The cooperation among agencies has not only been useful in the sharing of manpower and physical resources, but it facilitated the coordination and implementation of health services, community organization, and development activities, for students in the training areas.

The Province of Leyte

Perhaps by another act of providence, the invitation of the Governor of the province of Leyte to study the feasibility of establishing a medical school in Leyte one of the depressed regions in the

Philippines, badly in need of health manpower opened the final door to the creation of the UP-IHS.

Constraining factors

Being a sharp departure from existing systems, UP-IHS was be set by several constraints to implementation.

The University

In the beginning, there were objections to having two units of the state university in one province. UP College at Tacloban City had been established in 1973, and offers general education and graduate courses. But because of the mission of UP-IHS to develop a broad range of health manpower to serve the rural areas, because Leyte is in a region of the Philippines that is depressed and medically underserved, because no medical school existed in the region, and because of the invitation of the governor of Leyte to establish a medical school in the province: the initial objections were overcome.

Then in 1978, when UP-IHS was presented to the world medical assembly, the idea upon which UP-IHS was created found international acceptance because of its relevance to the global goal of "Health for all by the year 2000" and WHO primary health care policies.

The faculty

The burden of implementing a revolutionary innovation in health manpower development was placed upon a traditionally-oriented faculty. The innovation required that the faculty internalize the concept, change their pedagogic methodologies, increase their instructional preparation, and the like. Consequently, numerous orientation and sensitivity sessions, seminars, and workshops were held to assist the faculty in the transition to the new methods.

The dearth of full-time medical faculty in the Institute is still among its faculty constraints. Yet, the Institute has been able to continue operations, due to the participation of many part-time faculty from the regional MOH. In addition, field supervision is done also with the participation of the Rural Health Unit staff of the MOH.

The students

As an offshoot of the need to democratize admissions within the University of the Philippines System, and in line with the Institute's philosophy of service excellence rather than academic excellence, the students who enroll in the Institute are generally deficient in basic comprehension skills, both oral and written. The problem has been minimized through an assessment of their comprehension skills upon entry, and placing them into fast- or slow-learning groups, as appropriate, thus making each class more homogeneous. To further cope with these learning needs of the students, a tutorial scheme was developed. These approaches have proved to be of great benefit, as even the slowest learners, whose National College Entrance Examination ratings were below the accepted national passing average, have successfully passed the national licensure examinations for midwives and nurses.

Another constraint involving students was that the stepladder curriculum created the false impression, in the students, that everyone was expected to go on to the next step until the MD program was completed. It therefore became difficult to get students off the stepladder at some intermediate step and make them stay in their home community to serve for some time. Each student was determined to become a doctor some day. To correct this, a modular recruitment process was adopted. The specific needs of the individual communities were identified, and the training of the students was dependent on those needs. For instance, if a community needed a midwife, their scholar was trained as a midwife. The expectation of both the student and the community was for a midwife. Later, were the community to need the services of a health worker with more advanced skills, the student could go on to the next level.

Legislative considerations

Despite its recognition as an experimental program, the Institute was faced with the need to comply with the rules, regulations, and standard procedures of the Professional Regulation Commission.

Initially, the Certificate in Community Health Work was not acceptable to the Board of Examiners for Midwifery. The failure of the nursing curriculum to comply with certain provisions of the nursing law also initiated some negative reactions from the Board of

Examiners. These obstacles were overcome, however, through a series of consultations by key UP-IHS committee members with the Board, as a result of which suggested modifications were made.

Among the last to gain recognition was the medical program. One of the major impediments was that the Board of Medical Education (BME) requires from every prospective medical student — in UP-IHS or elsewhere — a Certificate of Eligibility to enter a medical school. Overcoming this barrier was a long and tedious process. Many meetings were held, involving key officials of UP Manila, the UP-IHS Committee and the local UP-IHS administration, and the BME. Finally, in 1983, the BME began to issue Certificates of Eligibility to enter a medical school to BSCH graduates, if they had already been endorsed to the medical curriculum. Later that year, the Board of Examiners for Physicians accepted UP-IHS students to take the Preliminary Board Examinations. Then, in 1985, the first group of UP-IHS medical graduates took the complete board examination for physicians. They registered a passing rate of 67%, and ranked fourth nationwide among 29 medical schools in the country.

The community

There has been a lack of resources to maintain the desired level of communication between UP-IHS and the students' home communities. Besides periodic briefings and communications sent to the endorsing communities, particularly upon the students' completion of courses and return to service, the Institute had to come up with other ways of involving the community in the recruitment and training of their scholars.

In 1984, the "Local Counterpart Fund," a fee to which is shouldered by the sponsoring community, was conceived as a means of further strengthening the partnership approach, and to increase the community's responsibility in the training and support of their scholar. Minimal though the fee may be, it also helps to augment the resources of the Institute.

The medical community

Despite efforts at an information campaign about the Institute, a large portion of the traditional medical community have not

accepted the feasibility of training a physician through the stepladder curriculum. Trained in purely subject-oriented and highly specialized curricula, they find it difficult to conceive that a competent physician can be produced in such a short period of didactic and practical work. They anticipate that the future graduates of the Institute will be second-rate physicians. They also fear that graduates of the BSCH level may soon practice beyond the scope of their training.

In response to these fears, the Institute has tried to stress the team concept in providing health care. Many rural health units in the country still do not enjoy the services of a physician. It is in these areas that the health practitioners, at various levels, are envisioned to serve, acting as links between the communities and the medical practitioners through patient referrals. In terms of scope of practice, workers at the BSCH level have certain defined roles, and it is really difficult for them to try to practice beyond their scope of competence. In time, we hope that a separate licensure examination may be given for these workers, just as physicians have to undertake specialty board examinations.

Perhaps the non-acceptance is simply based on attitudes which will take years to change. Perhaps, when the graduates of the Institute will have proven their worth, these attitudes will become more favorable.

Impact on the established systems, and future development perspectives

At this time, an assessment of the experiment's impact on the established program is not yet possible. A full-scale evaluation will perhaps be available in the next year. However, candid feedback and observation have been very positive.

Impact on the educational system

Locally, the Institute has elicited varied reactions from health science educators, ranging from vehement disapproval initially, to the beginning of acceptance in more recent years. However, the Institute has readily gained acceptance from other sectors. It has been invited for membership in the association of Philippine Medical

Colleges. And its graduates have been admitted to national licensing examinations and, subsequently, to the practice of midwifery, nursing, and medicine.

In addition, a number of schools in the organizing stage have requested copies of the curriculum, and have visited the Institute to gain insights from its experience.

On the international scene, UP-IHS officials have on several occasions participated in international conferences to share valuable experiences gained from the Institute's innovations. The Institute is also a frequent host to many visiting health science students and professionals who are interested in the program.

As we move on, we hope that we shall continue to influence curriculum planners towards more relevant changes in health science curricula.

Impact on service and the community

The Institute has been a source of trained health personnel for the MOH. The region has filled all positions for sanitation workers, midwives, and registered nurses, many of whom are graduates of UP-IHS. However, there is still a shortage of physicians, especially in rural posts. The CHN programs have made community-oriented nurses available for service in the Rural Health Unit of the MOH. The seventy-five percent of the students who returned to their home barangays during service leave also helped to augment manpower needs in the communities. The Institute's community health programs have also expanded primary health care activities in the rural communities to which the students have finally returned.

Although a majority of the graduates have remained in the rural communities, a negligible number — primarily among those from the BSCH level — have chosen to work in urban centers. However, those BSCH graduates have expressed a desire to go back and serve the rural communities, where they feel that the work would be more challenging and fulfilling. They feel that although monetary returns in urban centers are greater, the work is very routine and does not pose much challenge to them.

All of the eight medical graduates who passed the National Medical Board Examinations are currently serving in rural communities of the region, in the following capacities:

One is a Municipal Health Officer.
Two work in a missionary institution in the rural area of Samar (part of Region VIII).
Four are residents in rural district hospitals.
One is in general practice in a rural community.

None has gone abroad.

With the increased availability of health services, the health status of the community will improve. This will increase community consciousness that will further motivate them to work to improve further their situation.

It is therefore our hope that the organizational involvement of the community, together with their students, the Institute, and the other agencies participating in the improvement of local health conditions, will transfer into a force for improvement in the social, economic, and political conditions in the community. The ultimate goal is to develop self-reliance. It is our belief that when people are self-reliant and attuned to the process of change, they will continually work to improve their quality of life.

Evaluation of the experiment

After 10 years of implementation, it is deemed necessary to conduct an in-depth evaluation of the UP-IHS program.

Recently, UP Manila, through the office of the Vice-Chancellor for planning and development, organized a UP-IHS evaluation committee independent of the implementers. The committee was given the following tasks:

Review the UP-IHS experience and compare it to the original program objectives.
Update the objectives of the program.
Make recommendations for future action.

The committee met with former directors and committee members of UP-IHS, faculty representatives, and members of the staff of the office of the Chancellor for Planning and Development. The UP-IHS evaluation committee then made the following recommendations:

1. The principal determinant in the UP-IHS program evaluation process shall be the evaluation of the community-based services performed by its graduates.

2. The BHW, CHW, CHN, and BSCH programs shall be evaluated as soon as possible, along the lines stated above with a completion deadline of August 31, 1987.
3. A special study group shall be formed to develop an instrument for evaluating the BHW, CHW, CHN and BSCH programs. This shall include the following questions:
   Where are the graduates at present?
   Where have they been located since they graduated?
   What have they been doing since their graduation?
   What impact did the graduates have on the communities?
   How were the graduates utilized by the communities?
4. No curricular changes and no new non-MD programs should be introduced during the evaluation period.
5. The method of evaluation must adhere to the following guidelines:
   It must be community-based. The community is defined as the geographic area served by the graduate.
   It must include actual visits to selected communities by the evaluators.
6. The MD program will be evaluated separately with the following guidelines:
   Program evaluation will be based on the evaluation of the MD graduates' community service.
   MD graduates will be evaluated not earlier than 3 years after their graduation. Therefore, the MD program evaluation process will begin in 1988.
7. Graduates of UP-IHS medical program should not be awarded an MD degree,but should receive a more suitable degree, e.g., Doctor of Community Medicine.
8. Negotiation of a new Memorandum of Agreement between UP-IHS and the MOHand MLGCD is needed.

Future development perspectives

Having met the objective of providing basic health manpower for Region VIII (with the exception of physicians), UP-IHS is re-orienting its course offerings to be in keeping with the changing needs in health care.

The proposed direction of the new orientation is towards professional development of its graduates, through offerings of short

courses, seminars, and even courses leading to the degree of Master of Public Health. The emphasis will still be on community service. With the saturation of midwives in the region, the thrust of the undergraduate program will be towards the strengthening of the Bachelor of Science in Community Health course. Envisioned as the local counterpart of the nurse practitioner abroad, it is hoped that this category of worker will fill the gap in health care delivery in doctorless areas of the country.

Such curricular changes, however, will not exclude the training of other types of health worker. For example, a student may still exit as a midwife, if needed, or continue on through the medical program.

UP-IHS will continue to develop strategies for the training of health manpower for the rural areas. The students, the courses, the community service, and the communities themselves form a very rich base for conducting research for such strategies.

One of the current concerns of the Institute is the projection of its image, both locally and internationally. Despite the success of the past ten years, there has not been much of an attempt to publicize the program and its progress in innovating strategies for the development of rural health manpower. Much is to be learned, from the UP-IHS experience, that can be applied not only in the health field but also in the training of other professionals to meet the socio-economic development needs of the country. Unless we publicize our experience, others may not be able to benefit from it. We intend, then, to begin to document and publish our work.

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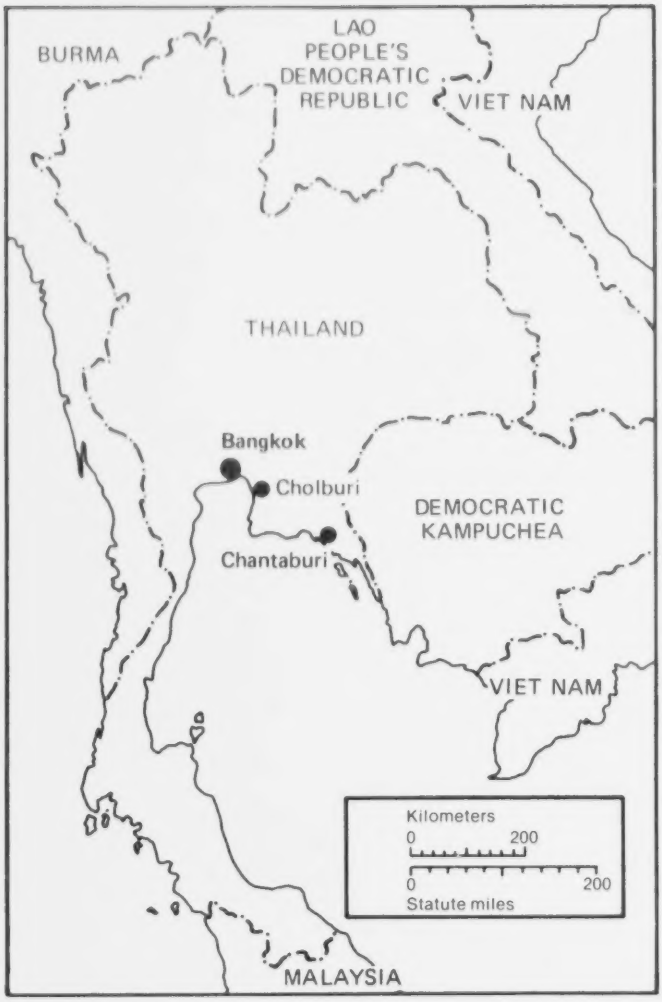
BURMA
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MALAYSIA

Chulalongkorn University, Thailand

The Medical Education for Students from Rural Areas Project (MESRAP)

Charas Suwanwela, Chaloem Varavit, and Seri Ruamsuke

At the Third National Conference on Medical Education in Thailand, in 1971, two important recommendations were made. First, Thailand needed many more doctors, and a method was required to fill this need. Second, an inadequate number of doctors were serving the rural areas – where the majority of the population live, and this maldistribution problem also needed to be remedied. At that time, Thailand had a population of 37 million, with a population growth rate of 3.3%. There were less than 6,000 medical doctors in the country in 1971, only a third of whom worked in the provinces.

In Bangkok, the doctor-population ration was about one to 1,000, but that for rural areas was about one to 14,000, and in some parts of the country it was as little as one to over 50,000. The four medical schools then graduated only about 400 new doctors each year. On the other hand, the national health plan called for the establishment of at least one hospital in each of the 600 districts in the country. There was definitely a serious shortage of doctors to work in this peripheral health care system. There were then only about 900 doctors for the approximately 1,200 posts which already existed in district and provincial hospitals, exclusive of the needed posts according to the new plan.

It was also recommended that large provincial hospitals and health centers operated by the Ministry of Public Health be used in clinical teaching. This would permit the increased number of students to be handled without excessive additional costs.

At that time, the vast majority of medical students came from Bangkok. Those whose secondary education was obtained up-country had much less of a chance to enter medical school. The National University Entrance Examination – one of the criteria for accepting students into medical school, was based upon academic achievement in basic scientific subjects. It favored students with good memories and those from better secondary schools. There was little chance for high scores for students from rural areas with inferior schools, even though some of these students might possess

other qualities more desirable for future doctors. This inequity in the ability to enter medical schools, which are publicly funded, was thought to be unjust. And it was also viewed as one of the major reasons for the maldistribution of doctors. Students from urban areas, like Bangkok, would rarely maintain a rural practice after graduation.

All medical schools answered the call of the conference, and, as national policy, initiated accelerated programs for training medical doctors. The schools started to recruit students from up-country, bypassing the National University Entrance Examination system. And provincial hospitals and health centers were added to the sites utilized for clinical teaching.

Different approaches, however, were also devised. The program at the Chulalongkorn University represents the most ambitious and innovative response to the needs. The program is called the Medical Education for Students from Rural Areas Project, or MESRAP.

Historical notes

Early in 1976, negotiations began between the Ministry of Public Health and Chulalongkorn University in order to launch a project to increase the production of doctors, particularly for the rural areas of the country. An agreement was reached, and a steering committee, together with four working groups, were established in November 1976. Chantaburi Provincial Hospital, in an underserved, rural province of 390,000 people, was selected as the field station for the project. The eight provinces in the eastern region comprised the project area both for recruitment of students and for job placement after graduation. The selection process of the first group of students began in September 1977. The project students were in addition to the total number of medical students entering Chulalongkorn University.

The project was endorsed by the National Economic and Social Development Board in February 1978, and the project, together with budget support, was approved by the Cabinet in the following month.

The first group of 10 students enrolled in the Faculty of Medicine of Chulalongkorn University, in Bangkok, in June 1978. They began their clinical years four years later in Chantaburi. In the meantime, four working groups on student selection, curriculum development, faculty development, and physical development were working with

a joint coordinating board to develop the program beyond its initial stages. A project office was established at the Faculty of Medicine, and a director and supporting staff were appointed. The Clinical Training Center at Chantaburi Hospital was officially opened in May 1982 by both the Minister of Health and the Minister of University Affairs.

The number of entering students was increased to 15 in 1979. In 1982, the intake area was enlarged to include the southern part of the northeastern region, covering an additional four provinces, and the number of entering students was increased to 40. In 1985, the number was further increased to 50.

Cholburi Provincial Hospital was selected to be another clinical training center, and half of the students have been going there since 1985.

The first group of nine students graduated in March 1984 and, after a year of internship, were posted to the district hospitals as planned.

In addition to periodic evaluation of various aspects of the program, a comprehensive evaluation was launched in 1986.

Philosophy of the program

Traditional medical education in Thailand is subject-based and lasts six years. After a year of medical sciences and two years of pre-clinical work, students spend three years in clinical training in urban hospitals. Despite the fact that medical graduates must spend three years in a rural or underserved area, few have stayed in such areas.

MESRAP was initiated with a firm belief that improvement in medical education can be achieved by utilizing innovative changes. It was set up as an experimental project.

The first hypothesis was that doctors trained in existing provincial and district hospitals, as well as in health centers, would be as competent as those with traditional training. But, the investment and overhead costs would be much lower than those that would be incurred by establishing a new medical school. A requirement of the program was that the graduates must meet the competency standards set by the Thai Medical Council, as well as the quality standards of Chulalongkorn University. The investment in the existing hospitals would be kept to a minimum, and be limited to the purposes of teaching and learning. No attempt would be made to transform the hospitals into specialized tertiary-care institutions.

The second hypothesis was that graduates would be better prepared, and more willing, to work in rural areas if certain prior arrangements were made, and a particular type of curriculum instituted. Accordingly, students were to be recruited from the areas intended for their work, and definite assignments of places of work after graduation were to be agreed to by the students prior to their acceptance into the program. The clinical curriculum would be problem-oriented, with increased and earlier exposure to community medicine.

Objectives

The general objectives of the Program include the following:

To increase the number of doctors for the country.
To train doctors with appropriate attitudes and skills to serve the rural population.
To increase the opportunity for students from rural areas to study medicine, and to return to serve their home communities.

Thus, the graduates of the program must possess the following qualities:

1. The ability to create good working relationships with the residents, as well as with other health and development personnel in the district.
2. The ability to identify health problems of individuals, families, and communities, especially in the eastern region of Thailand.
3. The ability to plan proper health services for individuals, families, and communities, taking into consideration relevant epidemiologic, social, cultural, economic, and political factors.
4. The ability to manage the health service system at the district level, including promotive, preventive, curative, and rehabilitative aspects, as well as managing the supportive functions for primary health care – training and supervision of district health personnel, gathering and reporting health information, and the development of community health activities.
5. The ability to design and arrange health education for the community, the family, and the individual.
6. The ability to give proper medical services as required by the people in the district, including diagnosis, treatment, and appropriate referral.

7. The ability to undertake life-long continuing education.
8. The ability to develop and maintain proper moral and ethical qualities expected of graduates of Chulalongkorn University; namely, understanding of self, the maintenance of self-directed education, creativity, rational thinking and behavior, responsibility, far-sightedness, and social consciousness and devotion.
9. The ability and willingness to work in rural areas of Thailand.

Student selection

The Committee on Student Selection devised a selection model aimed at the special objectives of the program. The qualifications for application into the program include the following:

> Thai nationality with registered residence in the eastern provinces for at least five continuous years before application.
> Completion of secondary education from schools in eastern provinces, with science majors, and with grade-point averages of not less than 2.5.
> Age not above 21 years on the first of January in the year of application.
> A history of good moral conduct and personality, as well as of good educational performance.

Those selected for this program are considered for scholarships from the Ministry of Public Health, and must sign an agreement to work for the Ministry for five years. They must also not apply for higher education elsewhere, otherwise their selection will be forfeited.

The selection process consists of two parts. The first part is under the supervision of a provincial committee chaired by the Chief Provincial Medical Officer. During the two years before completion of secondary education, those seeking admission to this program must apply to work for eight weeks in provincial hospitals, during which time they are assigned a variety of tasks, and are observed and evaluated by hospital staff. Those satisfactorily passing this evaluation must then sit for a written examination aimed at assessing attitude, aptitude, and maturity. They are also interviewed by the provincial committee. Five candidates are selected for each opening.

These five candidates then undergo the second part of the selection process, which is undertaken at the Chulalongkorn University. Here, the candidates take an academic achievement test which covers

mathematics, chemistry, physics, biology, and English, and which is aimed at a minimal level of competency to study medicine. There is then a personality test and mental health examination.

A committee, chaired by the Dean of the Faculty of Medicine and comprising the chief provincial medical officers in the project area, together with program officers, makes the final decision on the selection.

Each year, the Ministry of Public Health assigns posts, mainly in the eastern provinces for this program, at the district hospitals. Each selected student is then assigned to a specific post before he or she enters the medical school.

Training of provincial hospital staff involved in the selection process has been carried out in workshops and site visits.

Curriculum development and learning experiences

In order to reach a high level of achievement with a relatively low level of resources, the following types of educational management strategy and technology have been utilized:

1. Cooperative participation in curricular planning. All staff doctors at the Chantaburi provincial hospital and the Cholburi provincial hospital are actively involved as the main working force. Several staff members from each department of the Faculty of Medicine are involved in advisory or other capacities. Representatives from all other hospitals and health related institutions in the area have also participated at appropriate intervals.
2. Systematic formulation of educational objectives. General objectives of the program and specific behavioral objectives of medical education were explicitly delineated.
3. Organization of common courses. An analysis of educational objectives revealed several common objectives among several clinical subjects. They were therefore organized into common courses, using problems as points of departure. Seventeen priority health-problems were selected, and emphasis on these areas is made early in the clinical years. Self-directed learning packages on these topics have been produced and made available.
4. Utilization of existing health services. Real-life situations from which to learn are readily available in existing health services

in the hospitals, in health centers, and in the communities. Training of professionals and supportive personnel in these health service institutions has been going on since the beginning of the program. Clinical discussion both on the decision-making process and the attitudinal aspects in real service settings constitutes the main teaching activity. Clinical competencies according to the national standard are accumulated during a planned, gradual delegation of increased responsibility, and are recorded throughout the clinical years. The last year is used as an internship.

5. Emphasis on community medicine. Community medicine in this program covers 16% of the curriculum time. It is the highest among medical schools in Thailand, where about 8-12% is generally devoted to this area. Several district hospitals in the region are selected as sites where knowledge, skills, and attitudes appropriate to working in rural settings are expected to be learned. Several curriculum models for the teaching of community medicine have been planned, tried, and revised as required.

During the first year at the Chulalongkorn University, students attend classes in the Faculty of Sciences, as well as taking general educational courses in social sciences and humanities. Civilization, man and society, and reading and comprehension in English are examples of compulsory courses. Courses on behavior and psychology are also introduced. The second and third years, or so-called preclinical years, are spent at the Faculty of Medicine Chulalongkorn University. Neurosciences and Locomotor System represent integrated courses. Other subjects are arranged in a discipline-based manner. Clinical correlation conferences are, however, interspersed throughout the years. During the summer, students visit community medicine service sites, and participate in their programs.

Problem-based learning in the core topics as well as in clinical rotations covers two years. In the last year, the students function as interns with supervised, clinical responsibilities. In the last three years, the students have been able to reside at the Chantaburi or Cholburi provincial hospitals where dormitories have been built. This has reduced the housing and transportation burden on the students.

Faculty development

Development of the faculty at the various institutions involved in clinical and community medicine is one of the main activities of the program. Selection of new staff members takes new teaching functions into consideration. Training activities for existing staff members takes many forms, from workshops on educational technology to conferences on specific subjects. Scholarships are given for continuing education both in Thailand and abroad.

New incentives have also been introduced, such as academic recognition as assistant, associate, or full professors of the Chulalongkorn University for those with substantial academic contributions.

Program evaluation

Periodic evaluations of the various components of the program have been undertaken. Assessment of ongoing activities and resultant remedial recommendations have led to periodic modification of the program. Early in the program a cost-assessment project was undertaken which led to the increase in the size of the class to 40 or 50 students, which was estimated as the level of the most economical per capita cost.

In the first half of 1986, an evaluation of the graduates of the program was undertaken. Information was gathered from graduates themselves, as well as from their colleagues and supervisors. Answers to questionnaires were received from all 36 graduates so far produced from the program in 3 classes. All were working at the assigned posts; the first class had been working there for over two years. They estimated themselves as working satisfactorily, and the majority stated that the education received from the program prepared them adequately for the job. But some stated that they were doing primarily curative services, because the community development plan has not yet been introduced into their districts.

Responses were also received from the supervisors of twenty-seven, or 75%, of the graduates. Using a scoring method of 1 to 5, from poor to good, they rated the competency, attitudes, and human relations of the graduates as 3.45, 3.98, and 3.95, respectively, with standard deviations of 1.22, 0.96, and 1.07. When the various aspects of competency were considered, the scores were satisfactory in most categories. But in the ability to supervise and train other health workers and village volunteers, the rating was "superior" for the

MESRAP group. The overall competency, however, was not different from that of graduates from the regular program of the Chulalongkorn University or from other medical schools. Interestingly, the manual skills for some graduates appeared to be superior to those from other medical schools. Assessment of creativity, as expressed by new innovative activities, will be evaluated for MESRAP and other graduates in the future.

In general, the graduates were proud of their program and the patriotic nature of their mission. They appeared to have little anxiety concerning their obligation to work in the rural area. Preassignment and lack of alternatives seemed to help them to feel comfortable in that regard.

Although it has been demonstrated that the graduates from this program can function satisfactorily at rural health service sites, whether they will stay on to work in the rural areas after the completion of their five-year commitments is still a question.

One interesting side-benefit of the program has been the interest and vitality initiated in secondary schools in the eastern region. Better students who wish to study medicine, now stay home instead of moving to attend secondary school in Bangkok. Competition among schools in the provinces also is leading to many improvements, which in the long run, may be one of the most important lasting effects of the program.

Problems and constraints

As expected, the program met with many problems, but most were overcome. The devotion and cooperation of those involved has been extraordinary, and the program was understood and approved at all levels up to the Ministers and the Cabinet at the outset. However, the program has been running for six years; and in that time, there have been many changes of personnel at all levels. The directors of the participating hospitals have been promoted, and new directors recruited from outside the program. The medical school has had three deans in this period. These changes require a continuing exchange of information between the new personnel and those who are already participating in the program.

Support for the program — moral, financial, and otherwise — always falls short of satiety. The Chantaburi Provincial Hospital was upgraded by the Ministry of Public Health to be a medical center, which called for a large increase in the budget. But the upgrading has

been insufficiently funded due to a recession and limited national growth. This lack of adequate funding threatened the progress of the program. But, fortunately, international organizations and foundations, in particular the United Nations Fund for Population Activities and the China Medical Board of New York, have contributed to the program. These contributions have made several activities possible; namely, staff development workshops, the purchase of books and audio-visual aids, and the awarding of scholarships for teaching staff.

The teachers at the Chantaburi and Cholburi Hospitals, the district hospitals, and the health centers have been very cooperative. Nevertheless, there remain many problems. Lack of skill and confidence in teaching in the problem-solving mode have led a number of faculty to resort to didactic lectures. The patient-care workloads, both at the hospitals and at private clinics, compete heavily for teaching and preparation time. The promotion scheme used as a teaching incentive requires changes in the regulations, and negotiation with many authorities, because the community-based teachers are under the authority of the Ministry of Public Health, not the University. The former uses a position classification system; the latter, an academic ranking. Further, community teachers do not have the research opportunities afforded to faculty on campus. The plan has not yet been adjusted satisfactorily.

The student selection process, especially the observation period at the provincial hospitals, requires a lot of time and effort from the staff, and there have been inconsistencies in the results. The most reliable effect appears to be self-selection by students who change their mind and decide not to go into medicine after the exposure.

The students selected for the program are less prepared to study in the University than regular students, who have passed the National Entrance Examination. The adjustment has been painful for some. Many did badly during the first semester after admission. To help overcome this difficulty, an orientation and tutorial assistance program was organized. Adjustment and learning appear to improve in succeeding semesters with this support.

Future plan

It has been ten years since the inception of the program and there have been many changes both inside and outside the Medical School. The district hospitals in the eastern provinces, hospitals which used

to be remote and underdeveloped, have become more attractive than those in other parts of the country. Preassignment, therefore, is becoming an asset rather than just an obligation.

Ten years ago, there was a serious insufficiency in the number of doctors. But now, there will soon be an adequate number. As the medical needs of the country change, medical education must be appropriately readjusted. Quality of care and graduate performance will become more the focus of attention.

MESRAP has been a success. And now its experimental aspect must come to an end, and the program must be institutionalized. Discussions and negotiations toward this end are underway. For the future, expansion to other provincial hospitals, more innovative approaches in curriculum development, improved learning experiences, a more effective recruitment process, and a more informative evaluation system are all possible.

MESRAP has created experience, expertise, and confidence in introducing newer innovations into medical education in Thailand.

CANADA
UNITED STATES
Albuquerque, New Mexico
MEXICO
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Statute miles 0 400

University of New Mexico, USA

Primary Care Curriculum

Stewart P. Mennin, William F. Woodside, Edward Bernstein, Martin Kantrowitz, and Arthur Kaufman

Principal characteristics of the parallel and conventional track programs

The parallel track program

The University of New Mexico's experimental parallel track, called the Primary Care Curriculum (PCC), accepted its first class in 1979 (2). The program focuses on the first two years of medical school (Fig. 5), and it offers students small group, problem-based learning with early, sustained introduction of clinical skills and community health care experience. Tutorial groups of five students and one tutor meet three times per week during the first year, and twice weekly during the second year.

The tutors and evaluators are drawn from basic and clinical science disciplines in about equal numbers. To facilitate the diffusion of educational ideas, all faculty who teach in PCC also teach in the conventional track. Approximately one third to one half of the 73 students admitted to the University of New Mexico Medical School each year apply to PCC. From this group, twenty are selected. Students in PCC are subsequently compared to three control groups: (1) a group of students applying to, and acceptable to, PCC but randomized into the conventional track (this group is currently too small to be fully analyzed), (2) a group of students who selected the conventional track and are matched as closely as possible with PCC students by age, sex, ethnicity, and grade point average, and (3) the entire group of conventional track students, including groups 1 and 2 above.

The tutorial groups function to provide a forum for students to exercise and refine their clinical reasoning as they apply the basic medical sciences to real-life, biomedical problems. The goal of using small groups is to enhance learning by improving communication skills; by developing an appreciation for the emotional and social support that a group can provide; and by creating a forum for learning, and practicing, evaluation of oneself and one's peers.

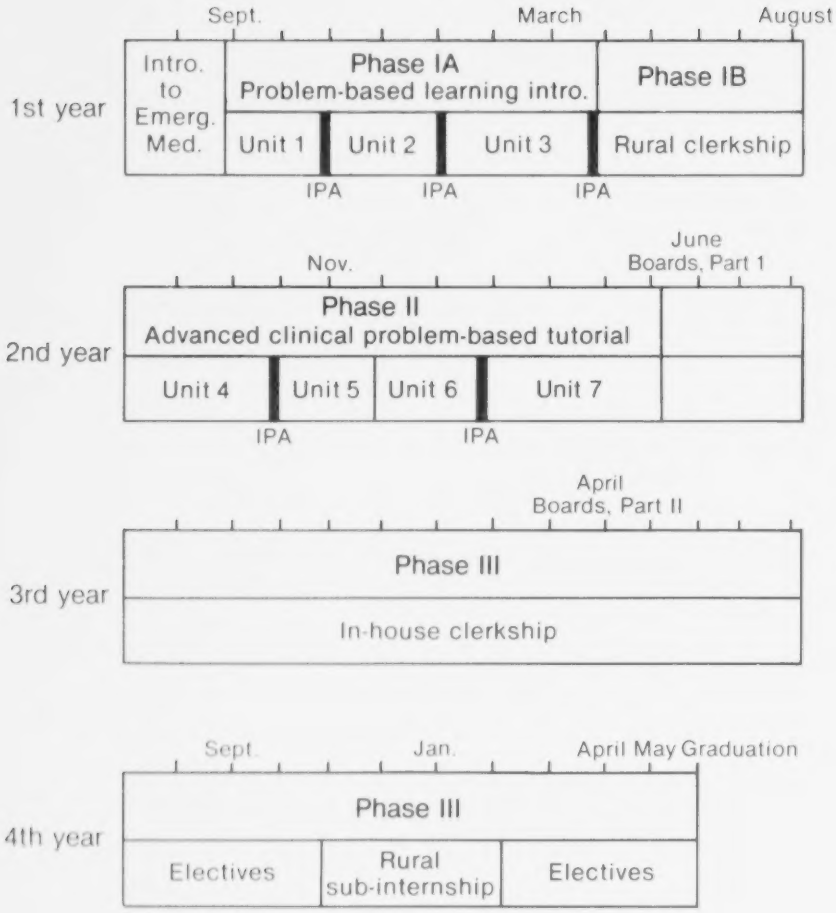

Fig. 5. Four-year schedule of primary care curriculum

Phase I

The freshman year (Phase I) comprises an on-campus phase (IA) and an off-campus phase (IB). The first six and a half months are devoted to Phase IA and are conducted on campus. The curriculum is divided into three eight-week units, each emphasizing a different theme. A

large part of each week is left unscheduled for students to pursue issues raised in the tutorial groups, and for clinical electives.

The first 15 weeks of Phase IA also include a problem-based, clinical skills session one morning per week (1). During this time, students learn the skills and scientific basis of a routine history and physical examination. They also have an opportunity to translate these skills into immediate use as they participate in electives which provide them with an opportunity to care for patients.

The last four to five months of their first year are devoted to Phase IB. For this period students relocate to rural, medically underserved areas of New Mexico. There, usually in teams, they live in the communities and work under the supervision of primary care physician preceptors. Functioning more independently, their goal is to extend and apply their self-directed, problem-based learning skills in a real-life setting. Instead of simulations and paper problems as springboards for study, they use actual patients in the office, or health problems in the community. Half the day is spent caring for clinic patients, and the other half is devoted to study and a community health project. One goal of Phase IB is to help students develop a balanced clinical experience reflecting the real world of health problems and medical care.

Special arrangements are made by the Medical Center Library to support the information needs of students and their preceptors. Upon request, journal articles, books, literature searches, and audiovisual programs can be sent to outlying communities within 24 hours. University-based faculty members serve as "circuit riders" each of whom visits one to three sites every two to four weeks. Progress of the students is reviewed, the interaction with their preceptor observed, and moral support for participants provided. Circuit riders also serve as personal links between the School of Medicine, students, and preceptors.

For many students, the rural Phase IB experience is the most important component of their early medical school experience. It can serve to galvanize their beliefs in the value of integrating clinical and basic sciences and the experience provides students with a more realistic basis upon which to orient the rest of their medical school experiences. Faculty have observed that in traditional curricula many students skim over the psychosocial aspects of case problems in the classroom. But when the students are involved with the care of real patients in the community, they become genuinely engrossed in such issues as occupational health, child abuse, and the effect of

poverty on access to health care. Many PCC faculty feel that community-based learning is probably one of the richest and most challenging settings for applying the elements of problem-based learning.

Phases II and III

Students return to the School of Medicine for their second year of study with a greater sense of what they need to know. Case problems in this phase are grouped according to the basic organ systems. At the end of Phase II, students take Part I of the examination of the National Board of Medical Examiners (NBME-1), passage of which is required for entry into year three at the School of Medicine.

Most of the remaining two years of training takes place in a tertiary-care, hospital setting. Students from both tracks (PCC and conventional) progress through the traditional clinical rotations together. During the fourth year, PCC students are required to do a two-month, primary care subinternship in a medically underserved area of the state.

Student evaluation

It is often said that evaluation controls the curriculum; what the faculty and administration evaluate is what the students come to value. In PCC, grades are based upon the evaluation by tutors, peers, and oneself in several areas: scientific reasoning, acquisition and integration of knowledge, communication skills, and ability to assess the skills of oneself, one's peers, and the group as a whole. These evaluations are made at the midpoint and end of each eight-week unit of study.

In addition, three times during the first year and twice during the second, students are formally evaluated by use of an Individual Process Assessment. Over a two-day period, this instrument assesses the student's ability to deal with a simulated patient problem, do an appropriate screening history and physical examination, formulate hypotheses, list learning issues, devise inquiry strategies, and pursue research into the patient's problems. The student then meets with a faculty member who reviews a video tape of the student's encounter with the patient, the laboratory tests requested, and the student's research into the particular problems identified.

In order to help PCC students prepare for NBME-I, a two-day comprehensive basic science examination, similar to the NBME, Part I test, is administered to them three times during the course of the first two years. The results are not counted toward their grades, but help students adjust their learning priorities according to strengths and weaknesses identified by these examinations.

The PCC curriculum is open to students' frequent suggestions for improving the learning environment. Students help revise case problems, improve evaluation techniques, and devise new methods for teaching one another.

The conventional track program

The conventional track program emphasizes the acquisition of an expanding body of knowledge and skills. The four-year curriculum is divided into two parts. The first two years are devoted primarily to the basic sciences, and the last two years to the clinical sciences.

The first year emphasizes study of the basic principles and concepts of normal structure, function, and behavior. Abnormal and pathological processes are the focus of the second year. In addition, during the latter part of the second year, there is a course, Introduction to Clinical Medicine, which initiates students into the procedures of the screening history and physical examination. Clinical electives, in which students interact with patients, are available throughout the first two years. About half the courses are taught interdepartmentally, the other half by discipline. While different courses offer a mix of teaching approaches – lectures, small groups, conferences, laboratories, self-directed study, and clinical settings – the lecture remains the dominant educational format. The majority of evaluation involves the objective recall of content.

In the third year, as in the PCC, students are required to complete a series of clinical clerkships (medicine, obstetrics/gynecology, pediatrics, psychiatry, surgery, and surgical specialties). The fourth year provides students with the opportunity to pursue a curriculum developed on a more individual basis as they continue their learning in the context of patient care.

Rationale, motivation, and major incentives for initiating the parallel track

The primary force for the initiation of the experimental track in New Mexico emerged from a combination of two problems. First, doctors are most needed for primary care out in the community; but this did not match their training, in tertiary-care hospitals. Second, doctors must assume responsibility for their own future learning, and they must cooperate with one another; but this, also, did not match their medical school training, where they learned passively and were rewarded for competing with one another. A new, more appropriate method of medical education had to be devised.

Several of the educational ideas for PCC emerged from a series of small, curricular experiments conducted in the early 1970s by the Department of Family and Community Medicine. Many of that faculty had spent their formative medical years in rural practice with minority populations in the Indian and Migrant Health Services before joining the School of Medicine. These experiences left a lasting orientation toward the value of practicing medicine where it was most needed and in the service of social justice. Thus, when this fledgling department developed its courses for first- and second-year students, the faculty discussed with small groups of students common primary care problems in their social and economic contexts. They also taught the students the basics of clinical skills, and demonstrated the relevance of much of the basic science coursework to clinical problems in the community. These initial experiments were done not in the medical school, but in the faculty's homes.

The enthusiasm of the students for these early efforts led to an important next step: taking students into the community to help with actual patient care. On an elective basis, about half the preclinical students spent one afternoon a week for an academic year caring for patients in such needy settings as nursing homes, youth shelters, and rural communities. The students worked in small teams under close faculty supervision. The faculty's enthusiasm for this real-life, community-based teaching was reinforced as students began to comment on how their community work complemented their classroom activities and drew them closer to their faculty preceptors. The faculty also began to realize that a significant amount of talent and energy in these beginning students had been lying dormant completely untapped. Now many students began to set up new

community health programs by working with a variety of community groups and social agencies. They developed a model treatment program for victims of sexual assault, and set up a new clinic for inmates on a prison honor farm. The faculty became convinced that real-life learning oriented toward community health care needs could form the core, not the fringe, of medical student education.

Also in the early 1970s, a second force for curricular change was brewing in the University. It was becoming apparent to a growing number of faculty that departmental, discipline-based learning was unsatisfactory. Students studied for grades, not for knowledge. And faculty felt distant from the students, to whom they lectured in large lecture halls. The system seemed designed more for the convenience of faculty, and for the prerogatives of departments, than for the learning needs of students.

Coupled with this was a realization that such a learning environment could have distressing social consequences. A number of faculty at New Mexico had begun to run weekly peer support groups for preclinical medical students. There, faculty confronted the anguish which was expressed by the of students: how they felt treated like children, felt isolated, insecure, jealous, and competitive. This produced enormous personal stress on students and undermined their personal relationships. Much of this distress seemed to be a consequence of the learning environment itself. Faculty who counseled these students felt more open to a curriculum in which students could learn in small, supportive groups in which they would know their faculty better, and where students could maintain a strong sense of control over their curriculum and themselves.

At this time three external developments helped crystallize ideas for an alternate curriculum. One was the advent of mid-level health practitioners (nurse practitioners and physician assistants) who demonstrated that in one or two years a student could learn basic and clinical science skills sufficient to care for common patient problems with minimum physician supervision.

Another was the development of "career ladder" education in the nursing profession, in which a student could move from licensed practical nurse to registered nurse, stepping outside to practice before re-entering. Why couldn't medical students obtain the skills of a physician assistant, go out to mature in the real world of practice for a while, and then return for an M.D. degree?

Finally, the development of student-centered, problem-based learning at McMaster University became known to New Mexico's medical educators.

With this background, a core group of faculty decided to introduce their new ideas in the form of a very small, parallel, experimental track (ten students per year out of a fixed admitted class of 73). The decision to use only a small experimental track was based on political reality. No one felt that it was possible to convince all faculty, chairmen, or departments to agree to a uniform curricular change. It seemed far easier to obtain grant money and permission to try a small innovation with volunteer faculty. This did not require departments to change what was already established, and it provided the faculty-at-large with the option of dropping the parallel track if the experiment did not succeed or if its funding ran out. Thus, it was a relatively comfortable way to begin, both for the dominant traditional educators and for the small group of innovators.

How the track was initiated and organized at the outset

The initial proposal, entitled "Pilot Project for Development of a Primary Care Medical School Track Beginning with Physician Assistant Training", requested a one-year planning budget of $42,000 from the W.K. Kellogg Foundation. The proposal contained the following five goals:

1. To educate highly qualified primary care providers who will work in underserved areas.
2. To provide an educational program that fosters interest in, and teaches skills for, the delivery of primary health care.
3. To revise the teaching of clinical and basic sciences in medical school so that their interrelationship is better appreciated by medical students.
4. To revise the teaching of basic sciences in medical school so that they are more clinically relevant and better appreciated by the student, and with less duplication of college coursework.
5. To enable medical students to provide needed community health care during their medical education.

The proposed program was to consist of three phases which culminated in an M.D. degree:

Phase I. Students will enter a physician assistant (PA) training program lasting approximately two years. The first year will entail

didactic and clinical training at the medical school. The major portion of their second year will be spent as PA preceptees throughout New Mexico in areas of medical need.

Phase II. Students will return to the medical school for more advanced study of the science basic to medicine. This phase will build upon the PA preceptor experience, the clinical training of Phase I, and independent study.

Phase III. The final phase will consist of advanced clinical clerkships, emphasizing increasing patient responsibility.

The immediate reaction of department chairmen to this novel proposal was generally favorable.

PCC representatives met with both the American Medical Association and the Association of American Medical Colleges' Liaison Committee on Medical Education (LCME), the medical school accrediting body, for approval of the concept of the initial PCC plan. LCME had two pertinent accrediting groups, one for PA programs, and one for medical school programs. PCC was disappointed by both groups. The representative for PA programs said that the portion of the PCC plan requesting PA accreditation for students completing their second medical school year was, politically, an untimely proposition. PA program organizers, they explained, were seeking to build an esprit de corps among their graduates. They hoped graduates would see their careers as terminal, not as stepping stones to becoming physicians. The request was, therefore, unacceptable.

The medical school accrediting group was also quite blunt. While medical schools themselves had the responsibility of determining their own education course, the notion of a career ladder built on PA certification was unacceptable to this accrediting body, for it would "bastardize medical education" by incorporating within it "physician assistant training".

It was clear that forcing this issue might sacrifice the entire effort in an attempt to preserve one component of the project. The career-ladder concept was thus removed from the final proposal. This was the first of many compromises made in order for the PCC program to survive, and was, in retrospect, an important experience in perspectives and priorities. Although the concept of PA accreditation as a mid-curricular end point was abandoned, the basic plan of education was retained.

Social, economic, and political forces supporting and resisting change

In the mid-1970s, New Mexico represented the epitome of the problem of maldistribution of physicians by geography and specialty. Although it was the fifth largest state geographically, it was sparsely populated (1.4 million). NewMexico was typical of many western states that have a concentration of people in a limited number of areas with the remainder spread over vast expanses. Access to, and coordination of, medical services outside the three largest cities was often limited and, in some cases, nonexistent.

Specialty maldistribution was another problem, and it was getting worse. In the decade prior to 1976 a smaller-than-ever percentage of physicians had entered the primary care specialties of family practice, general internal medicine, and general pediatrics.

Need for primary medical care throughout New Mexico was a particularly acute problem. In 1972, New Mexico, among the fifty states, ranked forty-ninth in primary care physicians per thousand population. Further, New Mexico had a large, impoverished, underserved minority population (40% were Hispanic, 10% American Indian).

The medical school had been established by the New Mexico State Legislature with the long-range objective of meeting the health care needs of New Mexico. Yet, by the early 1970s, few medical graduates were locating in underserved areas of the state. The 1977 legislature thus made a pointed request:

> "The Legislative Finance Committee urges the medical school to formulate a plan to encourage doctors to practice in rural areas where there is an inadequate level of available medical care."

The concern about maldistribution of medical care in New Mexico had become a legislative issue. The stage was set for change in the medical school.

The new parallel track addressed a medical need in the community, about which political pressure had been brought to bear on the medical school. The solution posed by the new track could indirectly be translated into dollar support for the medical school by the State Legislature, since this school is a state institution. Yet, within the School of Medicine a series of forces were arrayed against the new experiment. Many faculty were concerned that students would not receive an adequate foundation in the basic sciences. They felt that the experiment would threaten departmental control of curriculum and evaluation. The fact that the faculty supervising such

loosely structured learning were not even experts in that subject matter caused great consternation. And because it seemed that PCC planners were more interested in curricular innovation than in evaluating students' knowledge, the traditional faculty were quite upset.

PCC required students not only to choose their own learning issues, but to learn clinical as well as basic sciences, all within the two years traditionally devoted to basic sciences. Many traditional faculty worried that this system would leave students with large gaps in their knowledge. In addition, several basic scientists were concerned that if they weren't needed to teach in the new track, perhaps there would no longer be a need for traditional basic science departments themselves. It is a credit to the traditional faculty's flexibility and sense of experimentation that in the end they voted unanimously to begin the new curriculum.

Finally, the traditional faculty felt a genuine obligation to provide all students with the best possible education. Besides NBME, Part I, there was no standardized method to compare the academic performance of students in both tracks throughout the first two years of medical school. For many traditional faculty, NBME-I was to be the litmus test of the value of the new track. But, for PCC, it was the worst gauge of its educational accomplishments, since the examination tested purely basic science content, and had little to do with the goals or values of the new program. Nonetheless, all students must pass the NBME-I, to continue in their medical education.

Although the new track brought in some grant monies, it didn't bring in additional faculty. Thus, those volunteering to teach in PCC simply increased their total teaching load. Their fellow faculty were concerned that the careers of these volunteers would be in jeopardy because, as in most institutions, academic promotions are far more dependent on research grants and publications than on teaching.

Strategies developed to overcome barriers to change and to develop support forces

In retrospect, in the early years of the program, PCC faculty and staff too often dealt ineptly with criticisms from outside faculty. More often than not, PCC responded defensively, resisting the criticisms, dismissing the ideas of those who didn't accept at once the values and methods of PCC. This defensiveness was the result of

program insecurity. What PCC failed to grasp in these early years was that 1) almost every criticism has merit and has different layers of meaning; 2) no one is convinced of new educational methods by arguments; 3) new methods must be personally experienced to be best understood and embraced; 4) historically, decisions about curricular change are not made on the basis of scientifically proven results, but on political and funding imperatives; and 5) program planners confused PCC's values (e.g., enhancement of student control of their education, stimulation of student's social concerns by real-life experience) with its methods (no graded content exams, no lectures, use of non-expert tutors), inflexibly defending the latter instead of the former.

Our eyes were mercifully opened over the years. For example, in the planning phases, an organizational consultant ran a two-day workshop for PCC. About 30 basic and clinical science faculty participants, selected for their leadership and status in the medical school, joined the core PCC planning faculty in a planning retreat. This large group jointly fleshed out the program's goals and the strategies for achieving them. What was important was not the summary document from the meeting, but the process which, in two days, generated a broad consensus and a feeling of ownership for the ideas of the new program among a wide, influential sampling of the faculty.

The program obtained a three-year grant from the US Department of Education's Fund for the Improvement of Post-Secondary Education. The grant was for the purpose of facilitating faculty understanding of, and participation in, the new curriculum. It provided for the dissemination of PCC's concepts within the medical school by giving quid pro quo seed money to basic science departments. The actual dollar amount to each department ($5,000 to $15,000 a year, depending on the level of participation) was less important than the general perception that PCC was a vehicle for helping all departments. For PCC, the grant offered the program some political leverage within departments. This was an important element of respectability for a program which floated precariously outside the traditional departmental hierarchy, and outside traditional lines of authority (somewhere between the department chairmen and the dean to whom the PCC directors reported).

At first, PCC attempted to recruit faculty by offering a variety of task options: tutoring, evaluating, case-writing, administering. None but the role of tutoring was successful in truly transmitting the

values of PCC, and exciting the faculty's interest in the program. It is in the day-to-day work with a small tutorial group of enthusiastic students that light bulbs seem to turn on in faculty's heads.

Initially, the driving force for beginning the program had been a concern for motivating students to work in underserved communities. Political realities soon forced the program to drift rapidly away from this initial goal. Our political base within the faculty was too narrow, and the huge time demand of case development, faculty preparation, and program support forced us to focus upon the on-campus aspects of problem-based learning, to the detriment of the development of PCC's community-based phases. Further, while most PCC faculty could understand the concept of problem-based learning as the approach they themselves used every day, few basic science faculty had ever worked in the community, and few had any personal orientation toward primary care in its social context.

Over the years, these problems were addressed in several ways. First, to broaden our political base, key administrative positions in PCC were recruited from deanship posts (Undergraduate Education and Student Affairs) and school curriculum committees (chairs of Preclinical Oversight Committee, Clinical Oversight Committee, and Curriculum Committee). Next, the rural and community-based phases of the program were put under the Office of the Assistant Dean for Continuing Professional Education, where the program had high visibility and could meld with most of the school's outreach activities.

Finally, we began to argue less with our critics, to listen more, and to invite concerned skeptics to participate. A departmental discipline (subject) representative council was established. Through this council PCC could gather concerns, questions, and suggestions from each department, and could disseminate PCC developments to each department. Superb ideas continue to come from the council.

The role of funding, legislative mandate, and leadership in the planning and development of the innovative parallel track

Acquiring the initial Kellogg planning grant was a key factor in the initiation of the program, since it supported one of the basic values shared by faculty and administration, i.e., extramural funding for innovation, whether it be bench research or education. PCC's ability to attract funding helped to give the fledgling program credibility in

the eyes of school leaders and served to "get a foot in the door". Subsequently, the ability of the program to continue to compete successfully for extramural funding (grants have totaled more than $4 million over the past eight years) has contributed to its eventual institutionalization. In the meantime, base funding for the program has gradually been assumed by the State of New Mexico.

The role of leadership, charisma, and political placement was crucial to the development, implementation, and eventual survival of the program. The first planning grant from W.K. Kellogg was well written, but it was the personal impact of one of the program directors during a visit to the Kellogg Foundation that resulted in the actual funding. Another one of the directors was strategically placed. He wore two hats: one as Assistant Dean of Undergraduate Medical Education, the other as co-director of the new program. He was thus able to act as an important bridge between the traditional and innovative groups.

Time after time it was the ability of group members to argue, persuade, and compromise, without losing sight of their fundamental values that ultimately kept the program alive. The creative exuberance and prolific energy among the core members of the planning and development group were very evident.

Survival was the focus of the innovative program during its first three years. Everything was new, and management by crisis was the rule rather than the exception. From most large programs, businesses, and organizations there emerges a group of individuals whose dedication and hard work propel an idea into reality. These individuals, however, are not necessarily good managers. As PCC grew, became more successful, and faced more administrative demands, frictions developed over leadership style, the pace of change, and the degree to which students should control their own program. Factionalism among the leadership translated into conflicts within the staff. Much of this reflected the growing pains of a new program, the inevitable issues of ego and ownership.

The need increased for effective management and administration. Perhaps one of the most important developments was the emergence of the PCC professional staff (as opposed to faculty) as a leadership force in the program. The PCC program was innovative, and the administrative structure itself had to be innovative also. PCC's emphasis on faculty time being spent "in the trenches" with the students meant that the staff had to assume managerial tasks usually relegated to administrative faculty. Initially the staff resented having

this responsibility dumped on them without commensurate authority. They have fought bitterly, and somewhat successfully, to gain the deserved authority.

The payoff has been enormous. Faculty can devote more time to the endeavors to which they are better suited: teaching, writing grants, and trying out new innovative approaches to learning. Staff, who are in the PCC offices and hear students concerns on an informal basis daily, can identify program needs quickly, and can mobilize to address the problems in a timely fashion. Staff are divided into four areas: education, program administration, student assessment, and student support. Three faculty directors maintain responsibility for the entire program in each of the above areas. In addition, there is a director for phase IB (community phase) and a coordinator of a longitudinal program evaluation project.

The role of other institutions in helping to develop the parallel innovative track

Other institutions have played a significant role in the development and maturation of PCC. In the early phases of program development, when PCC planners were struggling with uncertainty, McMaster University offered an organized approach to the development of case problems, tutor training, student evaluation, and learning resources. A series of visits to McMaster convinced PCC planners that what they had envisioned on paper could work in practice in New Mexico. A review of McMaster's self-teaching learning modules, organized by their anatomy department, helped to stimulate PCC planners to develop their own creative approaches to developing study aids in the areas of clinical skills and library usage, and for case-related problems.

PCC realized that McMaster could not provide a road map for New Mexico's program. While problem-based learning was one of the technologies we wanted to employ, our community focus required a very different kind of model that did not exist at McMaster. Furthermore, the McMaster program had started with a new school, we had the task of trying to convert a faculty which had been hired to teach in a traditional format.

A more relevant model for PCC, in this regard, was the Upper Peninsula program at Michigan State University. There we observed how an integrated, basic and clinical science curriculum could be managed for a small track of students in small towns remote from

the mother institution. We also learned from Upper Peninsula the sobering lesson that medical school accreditors looked askance at educational environments that strayed geographically too far from basic science faculty. Our final curriculum was thus based much more on campus than had been our original intent.

In time we were asked to consult with other institutions interested in the changes we were attempting. We often learned more in the consultations than they did. From Morehouse Medical School, we learned of a strategy to bridge the gap between basic and clinical scientists. The University of Colorado demonstrated how we could adapt PCC to a single course. The collaboration between anatomists at New Mexico and Colorado gave rise to a national effort in education in the morphological sciences, which recently became an official part of the program of the American Association of Anatomists.

Over the years, we have come to realize that some of the most relevant, innovative ideas in community-based learning emerge in Third World countries. The National Autonomous University of Mexico (UNAM) broadened our view of the role of the community in medical education. We saw how first-year students could help care for a defined population, such as that in a barrio street or in an elementary school. This work brought epidemiology to life. We also learned that PCC's tutorial groups of five students to a teacher may be impractical for large schools with much smaller faculty-to-student ratios. We marvelled at how UNAM's faculty conducted tutorials for 25 students. As with Colorado, a collaboration developed with UNAM, and now student, resident, and faculty exchanges are commonplace between UNAM and PCC.

In China, the Second Shanghai Medical University expressed interest in PCC's parallel track model. In turn, we have learned from them how to modify learning strategies in a situation where there are no simulated patients or sets of paper problems, and where large libraries and other media resources are not readily available to students. They have shown us that effective problem-based learning can occur by using real patient problems; by using the libraries of individual faculty members, peers, and oneself; and by using more experienced colleagues as resources.

More recently, our participation in the third international meeting of the Network for Community-Oriented Institutions for Health Sciences, in Egypt, convinced us that it is not the methodology itself which is the greatest influence in bringing about change. Rather, it

is the relationship between the innovative idea and the political, economic, and social environment into which it is introduced. Ultimately, the innovation must translate itself into the realities of the institution, the faculty, the students and, most importantly, the people served by the health care system.

We have discovered that close personal relationships with like-minded educators elsewhere, developed over many years, reap rich rewards. As surface impressions fade, richer insights begin to emerge, even from the most traditional schools that are making what seem to be the smallest attempts at change. Within such small changes are universal lessons regarding how entire institutions change. We used to swell with pride at being asked to consult. Now we look forward to interactions with other institutions as opportunities to learn from them, and to continue to modify our own program on the basis of what they have discovered.

The degree to which the innovative track has influenced the conventional track

When the parallel track first began, frequent comparisons were made between the two curricula. In the minds of many PCC critics, we had unfairly portrayed the conventional track as an archaic approach to education. This resulted in a polarization of students and faculty. Students in either track felt compelled to justify and defend their curricular choices. Faculty, as well, held differing degrees of allegiance to each of the tracks. The beneficial effect of this competition, however, was to increase everyone's awareness of medical education. After five years, the polarity and defensiveness have diminished somewhat, and there is now an effort to develop and promote the best aspects of each curriculum. The medical school's Curriculum Committee recently completed a year-long study of medical education at the University of New Mexico. The committee praised PCC's innovations and goals, and urged intensification of efforts to improve the conventional track. Its study concluded that the school is best served by maintaining two co-evolving tracks, each learning from the other.

During the past few years, there has been a growing trend within the conventional track toward the use of more clinically oriented problems in conjunction with lectures, laboratories, and printed syllabuse. In addition, in almost every teaching block, the use of small-group and independent learning increased substantially. For

example, Anatomy has a long tradition of small groups of students working around a cadaver or in histology and neurobiology laboratories. Last year the faculty decided to experiment by increasing the level of the students' responsibility for their own learning. The number of students in the laboratory at any given time was reduced by half, peer teaching was introduced, and students were required to present orally what they had learned each week. Faculty teaching endocrinology pioneered problem-based learning in the conventional track. This year the Departments of Biochemistry and Pharmacology have introduced small-group learning into the second year conventional track.

The response from the students to these innovations has been strongly positive, and faculty feel encouraged to continue developing this kind of education.

It is hard to determine which changes in the conventional track can be directly attributed to PCC. It is clear, however, that PCC was one of the most significant forces stimulating a climate in which there was a broad reassessment of medical education, and a willingness to experiment.

The degree to which PCC has been influenced by the conventional track

Evaluation materials developed for the freshman Endocrinology course have become standard components of the PCC evaluation. Portions of the Neurobiology curriculum for the conventional track have been incorporated into PCC case problems. The Departments of Pharmacology and Microbiology have made major contributions to the conception, development, and refinement of the third educational unit of PCC ("Bugs and Drugs") in Phase IA. They have coupled this with the design and operation of a clinical skills laboratory in microbiology. The traditionalists' emphasis upon performance on NBME-I, as a criterion for advancement to the clinical years, resulted in PCC adopting the seven subject examinations. They are administered to PCC students three times during the preclinical years, and serve as a formative assessment of academic progress.

Many in PCC would like to believe that all the renewed interest in change and innovation in the conventional track is a result of the presence of PCC. Faculty who teach almost entirely in the conventional track feel, and rightly so, that they are innovators in

their own right and can now point to innovations they have fostered in PCC. With so much cross-fertilization between tracks, the chance for neglecting acknowledgments and failing to praise all who are deserving is great, and thus, many contributing faculty have not been properly recognized.

Outcomes and further developments

Outcome

The establishment of a separate, parallel track has provided a protected educational laboratory in which innovations could be tested and in which traditional faculty could sample new methods. The experimental environment has enabled student performance to be compared on the basis of curricular track.

The impact of the parallel track on the students, faculty, school, and state has been the focus of a longitudinal study. Over the years there has been a significant shift in student performance on national standardized examinations. In the early years of the program (1983-84) total scores on NBME-I, were significantly lower for PCC students compared to conventional track students (Fig. 6). But

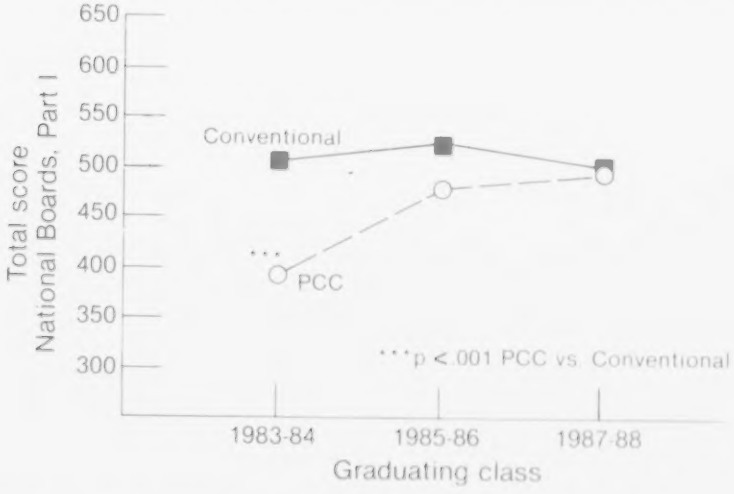

Fig. 6. National Boards Part I total scores

scores improved for the PCC track during 1985-86. The most recent data, 1986-87, indicates that since 1985 there have not been any significant differences between total scores in either track. Similarly, there has been a change in the total scores on NBME-II. While there were no significant differences between tracks in 1983-84, the current data indicates that total scores for PCC students were significantly higher than conventional track students during 1985-86 (Fig. 7). This most recent data does not support the conclusion that students in innovative programs slightly underachieve on traditional measures of medical knowledge when compared with their colleagues in traditional education tracks (Schmidt et al., personal communication). Finally, students in both tracks perform equally well in their clinical clerkships.

Students in both tracks begin medical school with the same level of distress. Thereafter, results showed that PCC students' perceptions of distress were significantly less over the first two years of medical school, in comparison to the conventional track (Fig. 8). One implication of this finding is that the small-group, problem-based approach may be more supportive, in that it helps students to handle more effectively the stress associated with mastering a large body of information. In contrast, the large-lecture format of the traditional track minimizes faculty contact, resulting in comparatively less opportunity for students to discuss problems and sensitive issues that may contribute to distress.

Students in PCC perceived their learning environment as more meaningful, open, and flexible than did conventional track students across all semesters. PCC students' expectations about the meaningfulness and flexibility of the learning environment were met and, generally, exceeded over time (Fig. 9). By comparison, conventional track students perceived the content of the curriculum as progressively less relevant over time, but not less flexible than initially expected. PCC students perceived the emotional climate as significantly more favorable than did conventional track students during all semesters. For both tracks there was a progressive decline across semesters in perceptions of the degree of closeness among students (the decline was slightly greater for conventional than for PCC track students). Attitudes toward the learning environment were consistently related to distress levels of conventional but not PCC students. This suggests that much of the distress experienced by PCC students might be better explained by factors external to the curriculum, whereas higher distress levels in conventional track

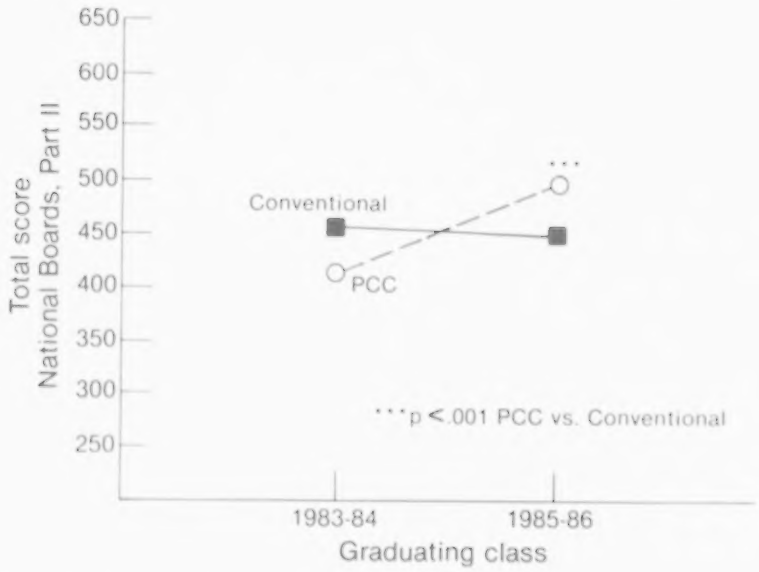

Fig. 7. National Boards Part II total scores

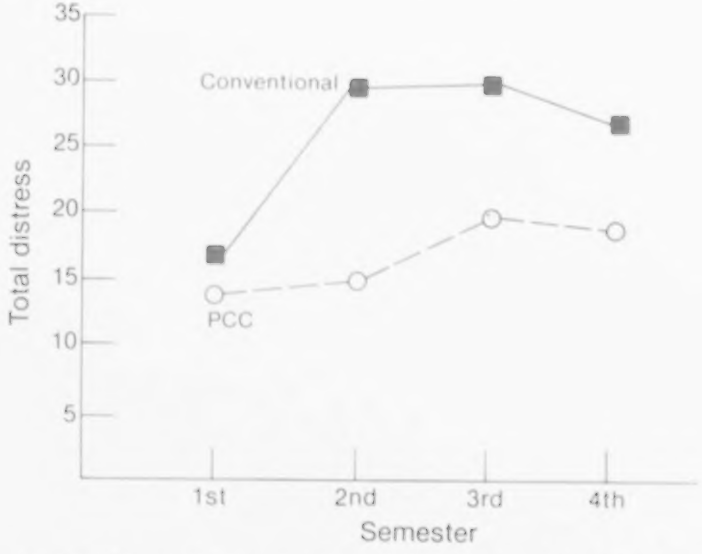

Fig. 8. Mean total distress scores on Kellner's Symptom Questionnaire for PCC and conventional track students. The standard error of the mean ranged between 1.4 and 2.0

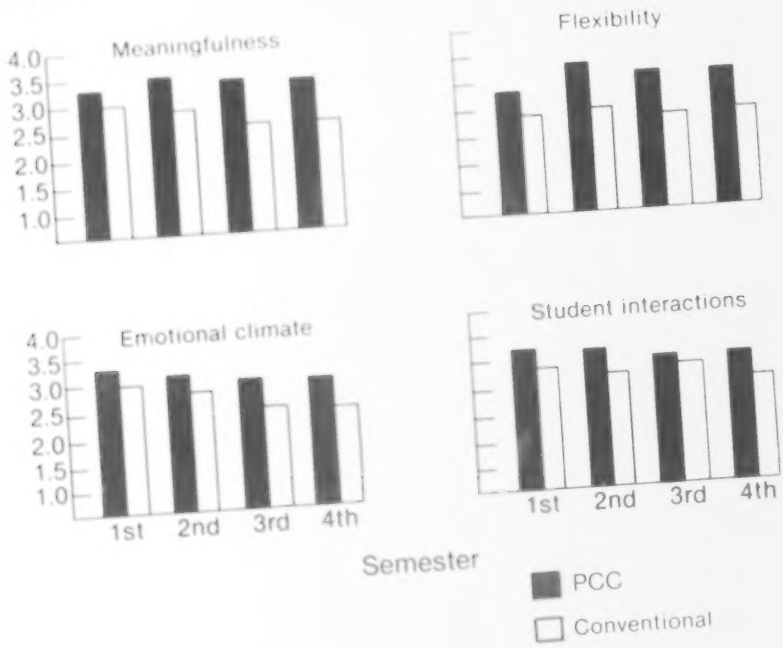

Fig. 9. Mean ratings on the Learning Environment Questionnaire for PCC and conventional track students. The standard error of the mean was 0.1 for all data points

students appear to be partially related to less favorable perceptions of the learning environment (4).

Upon entry into medical school, family medicine was the most preferred specialty among PCC students, while non-primary care specialties were the dominant preference of conventional track students (Fig. 10A). By the end of the second year, the preference for family medicine declined slightly among PCC students and rose slightly among conventional track students (Fig. 10B). Both tracks showed a slight increase in preference for internal medicine and pediatrics. For conventional track students, residency selection indicated a decrease in preference for family practice and "other", and a large increase in preference for internal medicine (Fig. 10C). In PCC, however, there were no significant changes in career preference between the second and fourth years.

Although the numbers are small, it is of interest to note that, for PCC students, there were shifts in career preference only within the first two years. Thereafter, during the "clinical years," their career

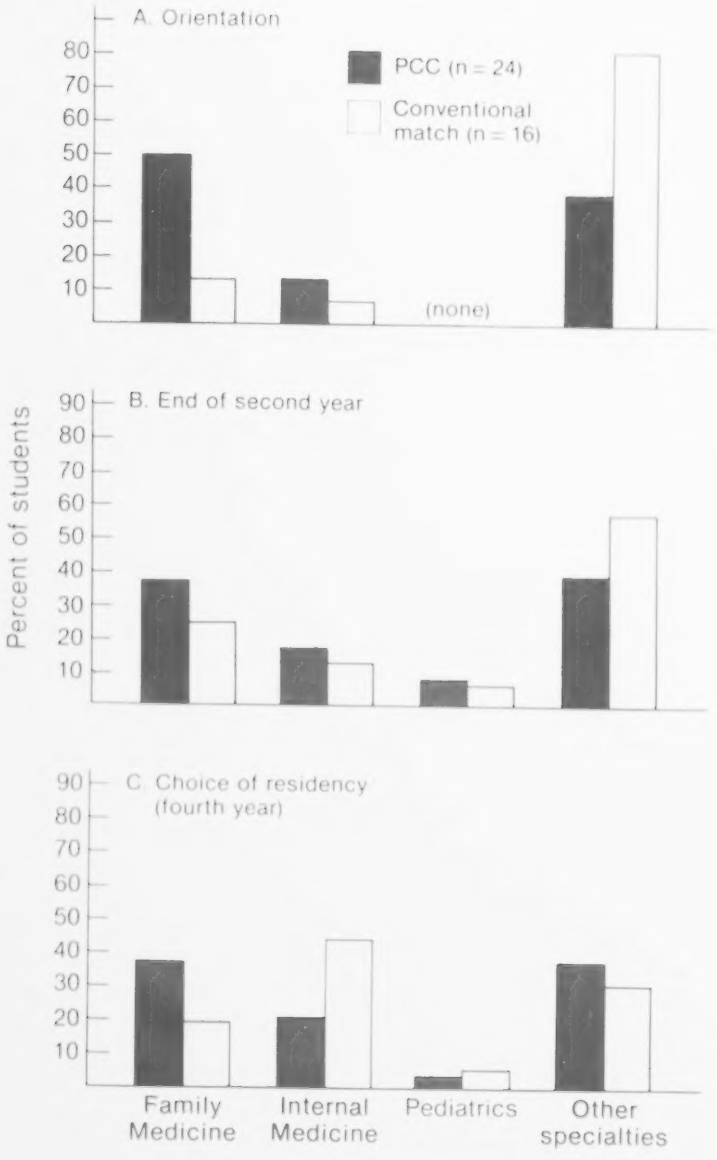

Fig. 10. Career preference: comparison of PCC with conventional matched students—graduating classes of 1983–1986

preferences remained stable. Perhaps the intense PCC experience of the first two years, during which students have lived for a while in a real practice community, enables them to make a firm choice.

For conventional track students, on the other hand, what was it that caused the large increase in preference for internal medicine during the "clinical years"? It may be that this increase was related to the role models to which these students were exposed during that time predominantly internists and hospital-based physicians. If this is true, then in terms of career preferences, the PCC students seem to be less influenced by this hospital based experience. Additional study is needed before this issue can be clarified further.

Finally, the rate of students leaving their classes or requiring additional time to complete their studies was equal for both tracks.

The existence of parallel tracks at the University of New Mexico has also enabled an assessment of the relative cost of problem-based versus conventional medical education. Analysis suggests that if the entire curriculum were conducted in a small-group, problem-based fashion, the cost in faculty hours/week/student would be almost identical to that of the conventional, lecture-based system (3) (Fig. 11). Further, when the distribution of faculty time devoted to medical education is analyzed, there are significant differences between the two tracks. In the conventional curriculum, the great majority of time is devoted to preparation for contact with students (Fig. 12), whereas for the problem-based track, the great majority of time is spent in actual contact with students (3) (Fig. 13).

The institutionalization of PCC is a double-edged sword. Although there is great satisfaction in seeing the innovation grow to the extent of becoming part of tradition, the excitement of creating something new is fading. There is a danger of loss of enthusiasm among those of us who pioneered the program. New endeavors— applying the educational principles of PCC to the clinical years, collaboration with other universities ali draw faculty away from the management of the day-to-day operations of PCC. The growth of the program has increased further the demand for energy devoted to management. Thus, the workload has continued to expand out of proportion to available resources, and many of the faculty and staff feel overloaded and overworked. The program must continue to recruit faculty who have not fully participated in PCC in the past.

Even within the dedicated "inner circle" of PCC there has been dissonance because the people who do the work are not always the ones who get the credit or benefits. PCC is associated by many at the

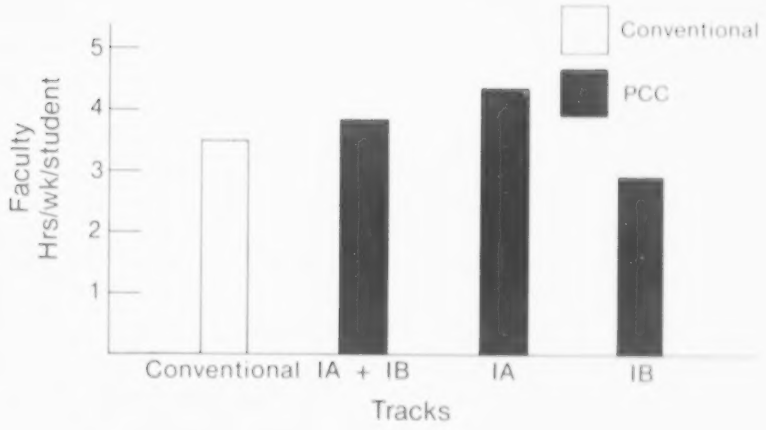

Fig. 11. Faculty time required to operate the conventional and the problem-based tracks. The problem-based track is illustrated two ways: (1) combining both the on- and off-campus phases (1A + 1B), and (2) with each phase separate

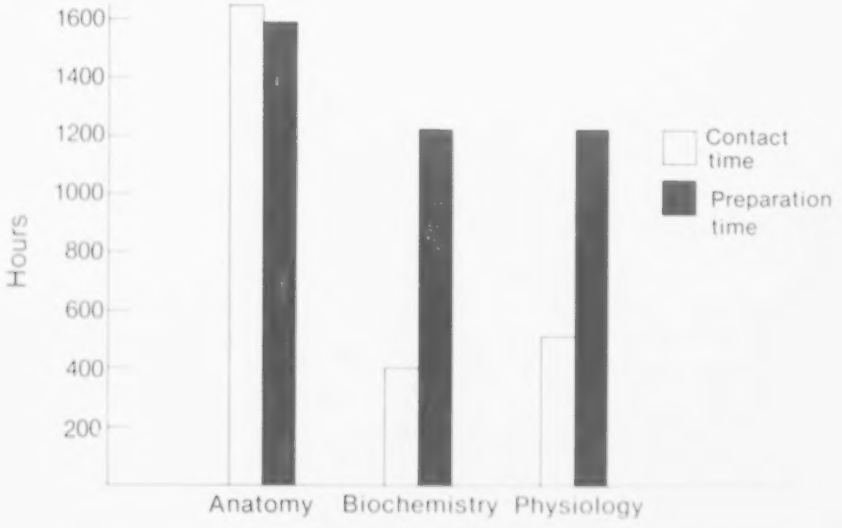

Fig. 12. Teaching time devoted to medical students during the first year of the conventional track. These three departments account for 91% of the classroom activities during the first year of the traditional track

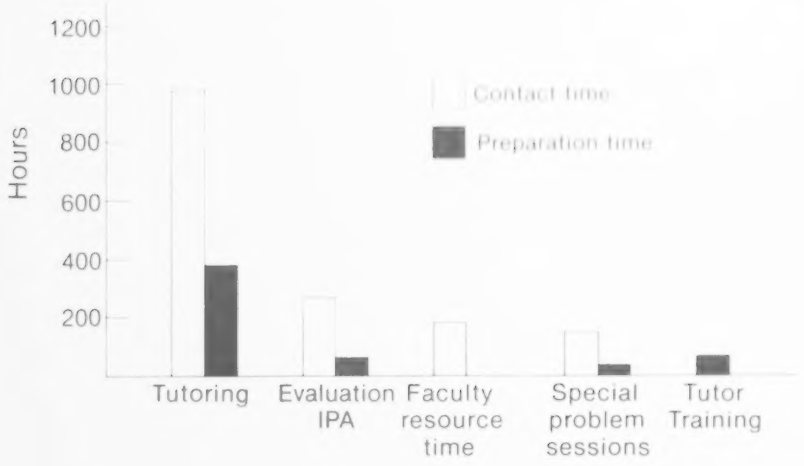

Fig. 13. Teaching time devoted to the problem-based track during the first year of medical school

school and worldwide with the names of some of the directors. This has led to resentment among some faculty and staff. The resentment has been voiced, and as a result, there is now much more awareness of the need to share the limelight, and to match rewards and efforts more appropriately.

Other concerns are related to the difficulty in measuring some of the behaviors PCC is seeking to influence. For example, we have not yet found a method of reliably measuring life-long learning. Standard measures of clinical performance during the third and fourth years do not permit us to assess those aspects of students' performance emphasized during the first two years of PCC, such as interaction among themselves, and interest in the community, etc.

Further developments

There are three areas of new emphasis. PCC has expanded its collaboration with other medical schools that are attempting innovation, nationally and worldwide. A major grant has been written to support a joint project to provide community-oriented primary care along the border between New Mexico and Mexico.

The proposal also seeks to enlarge our collaboration to include medical schools in Central and South American countries and in other southern border states in the United States.

The School of Medicine has received a grant from the US Department of Education's Fund for the Improvement of Post-Secondary Education, to develop and implement a medical self-assessment center. The center will house a broad range of tools and instruments with which learners, regardless of level or experience, can assess their knowledge, skills, and attitudes. Feedback will serve to guide their future learning.

Other new directions are the introduction into the clinical years of small-group learning, centering on patient problems; the training of residents as tutors for third- and fourth-year medical students; and the introduction of skilled basic scientists into the teaching of these same students.

The decision by PCC to maintain itself as a continuously evolving experimental track, able to remain flexible and to test new ideas quickly, was critical. It revealed an awareness that trying to convert the entire school to what is currently PCC would only lead to its own dogma and rigid bureaucracy. Instead, by maintaining a parallel track, we are institutionalizing the process of change itself. There are no final answers, simply better ones at this time.

Acknowledgments

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CANADA
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Rush Medical School, USA

The alternative preclinical curriculum

Gerald S. Gotterer, Phyllis Blumberg and Harold A. Paul.

Principal characteristics of the parallel and conventional track programs

The parallel track program

Rush Medical College, in Chicago, Illinois, accepted eight students into its new parallel track, called the "Alternative Curriculum," in September, 1984. This pilot group was followed by the full complement of 18 first-year students in September, 1985. The Rush program is therefore quite new and is still evolving.

The curriculum has been designed as an alternative to the traditional two-year preclinical curriculum. Students completing the Alternative Curriculum enter the regular third and fourth year clinical curriculum along with students from the conventional preclinical program.

The Alternative Curriculum is small-group in format, and problem-based in focus. The faculty are not expected to provide formal, scheduled lectures.

The conceptual focus of the curriculum is the small-group, problem-solving session in which basic science issues are identified and discussed in the context of clinical problems. The sessions are scheduled for two hours, twice a week, to allow adequate intervals for study, while providing adequate frequency of sessions in order to sustain momentum.

Following the pilot year, during which all eight students were in a single group, the groups have each contained six students. Each group is guided by a clinician "facilitator". Each facilitator is a well qualified generalist who is specially trained for teaching in this format. Training emphasizes the use of Socratic techniques, and restraint in providing information. The facilitator must be able to guide the students to identifying the key underlying basic-science issues, while controlling the tendency of most traditional medical school teachers to give mini-lectures.

So far as we know, we are the only school that restricts the facilitator role to clinicians. That decision was made because 1) our

basic science departments are relatively small and already have heavy teaching commitments, 2) we have access to clinical people who have good basic science grounding, and 3) we wished to model basic-science reasoning within clinical problem-solving.

However, basic science faculty are heavily involved in the program as "resource faculty". In this role, they consult with students and faculty alike on basic science issues, in formal and informal settings. During our early planning, the adequacy of basic science faculty resources was a major point of negotiation with the basic science chairpersons. After paying careful attention to this faculty role, we have experienced no strong sentiment opposing our present exclusion of basic scientists from facilitator roles. Occasionally, however, we have heard from basic science faculty that they would welcome a chance to participate as facilitators. On two occasions we have made exceptions to the general rule. Last year and this year we included a pharmacist who is also a nutritionist. This year we included a neuropharmacologist.

Facilitators are recruited by project staff, assisted or advised by the other facilitators. They are provided with an intensive, two-day training weekend in which they lead actual group sessions in a room equipped with videotape cameras and one-way mirrors. The project staff then continues to monitor the facilitator, especially during the early weeks of group activity. Enthusiasm is high. To date we have had only two resignations. One facilitator moved to another university. Another was clearly too busy, and possibly uncomfortable with the basic goals of the program.

The clinical problems are carefully selected on the basis of their ability to focus student attention on the more important basic science issues. The selection and development of cases involve dialogue between basic and behavioral science resource persons and clinicians. After an outline of the basic flow of the curriculum for the quarter has been developed, the basic scientists identify key issues which should emerge from the cases. Project staff working with clinical faculty select cases which highlight these issues. The basic scientists often indicate that a specific type of case would be desirable, say a diabetic in coma, or a case of gout, or of thalassemia. After the cases are written, they are again reviewed by the resource faculty and, based on their suggestions, are revised. The small-group facilitators are cued in advance to the key issues which the students should generate from each case, though students are not limited to the predetermined agenda. Nevertheless, since the facilitators know

all the faculty-generated learning issues of the cases, they use these as global guides, in their own preparation and as a way to monitor overall progress.

The clinical problems are presented in multiple formats, including written form, live simulations, and real patients. The small-group setting also provides the format for learning the skills of history-taking and physical diagnosis, and for examining the affective, interpersonal aspects of the doctor-patient relationship. Much of this is developed or reinforced in a separate component, called "Introduction to the Patient," which meets once a week for most of the two years.

The clinical problem is the primary tool used to train students in the clinical reasoning process. The group looks at a clinical problem, generates hypotheses to explain the underlying processes, looks for evidence to support or reject the various hypotheses, identifies issues for new learning, and then disperses to conduct further study, either individually or in groups. The group then reassembles to reexamine the case in an enriched manner based on the intervening study. The clinical problem drives and controls the learning of basic science study.

The curriculum has been organized so that the focus moves quarter by quarter through the various disciplines of the standard basic science curriculum. In the last two quarters of the second year, Introduction to the Patient involves hospital experience one half day each week. This provides students with experience in history taking, physical examination, and patient workup. It includes discussion with faculty, and problem-based discussion of the use of diagnostic techniques in clinical problem-solving.

The students are provided with "guidebooks," which are aids to the organization of the students' learning. The guidebook outlines the minimum learning objectives for each unit, indicates the learning exercises available (e.g. computer-based simulations), includes self-assessment examinations, and may provide a bibliography.

Our objective in developing the guidebooks was to provide students with a study framework which was integrated among disciplines and around themes. A further objective was to outline the scope and extent of knowledge expected. We have anticipated the tension that this may provide within a problem-based approach, and have chosen to live with that tension. At the present time, we note that there is, in some curriculum units, an evolution toward case-oriented guidebooks. However, the basic intention for the

guidebooks continues to be the provision of a general description of subject matter.

The small-group case discussions are supplemented by scheduled sessions with resource faculty. The frequency and format of these sessions have varied from discipline to discipline and are continually under review. These sessions provide an opportunity for focused discussion and study in the area of a specific discipline. In certain disciplines they are used for assisting students in laboratory study (e.g. anatomy and pathology). They have been used for responding to student questions about basic science, for more in-depth discussion of the basic science issues raised in the group problem-solving sessions, and for faculty to present mini-lectures which provide students with an organizing framework for the study of particular areas within the discipline.

Considerable attention has been directed to developing an approach to evaluating the problem-solving skills of students, which is a fundamental goal of the Alternative Curriculum. Rush requires that students in both curricula pass the Part I examination of the National Board of Medical Examiners (NBME), an examination that does not focus on these skills. Accordingly, in order that the students may be able to pass this examination, the Alternative Curriculum faculty have taken the position that the students should memorize key factual material in the various disciplines. Therefore, students are provided with a series of examinations to help them assess their progress in this task, and to provide a guide for pacing their study. However, the faculty has designed an additional form of evaluation which focuses on problem-solving and interpersonal skills. Students are evaluated formally at the end of each unit, i.e., three times each year. The evaluation scheme has three components:

1. Each student is evaluated on his or her ability to analyze a clinical problem utilizing the type of problem-analysis which the group carries out regularly in the small-group sessions. This is a multistep exam. The first part is written, and requires the student to list and rank hypotheses, and to explain the reasoning used. After an opportunity to use references in the library, the student is reexamined orally by a facilitator who has not previously worked with the student. This portion is termed the individual problem solving examination. It counts toward 30% of the quarter grade.
2. The student is evaluated on his or her ability to analyze problems within a particular disciplinary focus. This

component is entirely written, but is also in multiple stages. The student is presented with a problem and is required to generate and discuss hypotheses. Additional information is supplied, and the student is asked questions about the issues in multiple cycles. These questions assess the student's ability to apply factual material in order to solve problems within specific disciplines. We term this the content examination. It counts toward 50% of the quarter grade.

3. Finally the student is evaluated on his or her participation in the group problem-solving process. The facilitator, the other students in the group, and the individual student contribute to this evaluation. This counts toward 20% of the quarter grade and is determined as follows: facilitator 12%, peers 6%, self 2%. In addition, students are required to pass competency exams on their clinical history taking and physical examination skills.

During the first year, no-penalty midterm examinations are given; these familiarize the students with the new examination formats. We have had several occasions for make-up examinations on content. One student was required to study anatomy over the summer and to retake the examination at the end of the summer. To date, no students have been failed from the Alternative Curriculum.

Selection for the Alternative Curriculum occurs only after the student has been accepted to Rush Medical College. An applicant's interest in the Alternative Curriculum does not influence the decision on acceptance by the Rush Medical College Committee on Admission. Students entering the Alternative Curriculum are all volunteers. They are excluded only if there is concern, based on their prior academic achievement and experience, which would suggest that they would not succeed in the independent, self-motivated format of the Alternative Curriculum. This selection criterion has been adopted because of the newness of the program and the uncertainties about what student characteristics are most likely to lead to success with this format. This question is under active investigation.

The participation of faculty involved in the Alternative Curriculum has been negotiated with each department independently. Appointees to the Alternative Curriculum basic science resource faculty have had extensive experience in the conventional preclinical curriculum. With one exception, they continue to teach in the conventional curriculum in addition to their

involvement in the Alternative Curriculum. The one exception is an anatomist who fulfills his teaching obligations by his contributions to the Alternative Curriculum alone. The facilitators, on the other hand, include clinicians who have been, and continue to be, active in teaching during the clinical years of the curriculum. The Alternative Curriculum represents their first major venture into the preclinical curriculum. In addition, a group of general internists who have been interested in teaching, but who have been given only limited opportunities to do so in the past, have been recruited for the program. Almost all faculty who have participated in the program are enthusiastic about the benefits of this new approach to medical education.

Reservations about the new curriculum from non-participating faculty have tended to focus on 1) fear of an excessive demand for faculty time, and 2) concern that there might be a lack of rigor in curricular content. We believe that these concerns will be reduced as the concerned non-participants gain experience with the curriculum, either directly or indirectly.

Conventional preclinical curriculum

The conventional program is lecture based and has as a primary goal the definition of the body of basic science knowledge that a student should acquire before starting study in the hospital setting. The curriculum is organized by discipline, with four or five different courses being taught concurrently. During the first year, the students have courses in anatomy, histology, biochemistry, physiology, behavioral sciences, neurobiology, preventive medicine, microbiology, and immunology. During the second year, there are courses in pharmacology, psychopathology, and two closely coordinated courses in pathology and pathophysiology. The latter course was reorganized last year to provide three-quarters of the teaching in a large-group (25 to 30 students per group), clinical problem-based discussion format which uses clinical vignettes as the basis of instruction. The remainder of the teaching in this course is in lecture format. During the second year, the students also have a course addressing the skills of history-taking and physical diagnosis. Though there are some lectures for purposes of orientation, the bulk of the instruction in this clinical skills course is in small groups with one instructor to four students.

Evaluation of students in the conventional curriculum is almost exclusively by short-answer and multiple choice examinations. The conventional program has provided students with a sound background in the basic sciences consistent with traditional objectives in medical education. Students are left very much on their own to develop skills in integrating the knowledge from the various disciplines, and applying the knowledge to clinical problem-solving. There is little stimulus towards the self-evaluation of what is being learned and why.

The clinical curriculum

Students from both of the preclinical curricula enter a common, conventional, two-year clinical curriculum. This includes required clerkships in internal medicine, surgery, obstetrics/gynecology, pediatrics, psychiatry, family practice, and neurology, totaling 54 weeks. Students must also take 24 weeks of elective study, including a four-week required subinternship in either internal medicine or family practice. The clinical years provide students with an opportunity to participate in the direct care of patients as members of a team of physicians and other health professionals. As their knowledge and talents expand students are able to increase their level of involvement and responsibility under the supervised conditions of the patient-care setting. Students are supervised and taught not only by attending physicians, but also, to a large extent, by resident house officers.

Role of other institutions in the development of the alternative curriculum

The existence of problem-based curricula at other institutions, particularly the McMaster model, was of significance during the conceptualization of the Rush model. We benefited from the writings of, and discussions with, Dr. Howard Barrows, as he guided the introduction of problem-based education into the medical curriculum at Southern Illinois University (SIU). He pointed out the problems we would have if we attempted only to inject problem-solving exercises into an established conventional curriculum, or to teach only one subject in this way, while leaving the other subjects in their traditional format. He explained that the students would not use their free time for the independent study components of the

problem-based approach, but would instead use it to meet the clearly defined study demands of the traditional curriculum.

The existing literature on problem based curricula and consultation with others—for example at SIU, McMaster, and New Mexico—challenged the designers of the Rush model to develop some clarity in their own thinking about how much guidance should be provided to students regarding their learning. Should the problems serve as the sole stimuli to lead the students to discover what the learning objectives are, or should the problems be supplemented with more specific statements of objectives? Rush chose the middle ground and made the problems more explicit and directive than other models.

Some of our faculty participated in workshops at SIU run by Dr. Barrows and his faculty, and visited the programs at McMaster and New Mexico. Two of our physiologists had the opportunity to consult with the faculty at Newcastle in Australia. These visits were most helpful in exposing Rush medical faculty to non-conventional modes of teaching, and piqued their enthusiasm for participating in the development of the Alternative Curriculum.

We have taken advantage of the existence of the dual track program at New Mexico to confer about a variety of issues that have arisen while developing the program at Rush. We anticipate that the network of innovative medical school programs, now in formation, will facilitate inter-program assistance even further.

The Rush program had the further benefit of extensive discussions with a student who had had an excellent experience with the Michigan State problem-based curriculum, but who transferred to Rush in her third year because personal reasons necessitated a move to Chicago. Her comments, and also a review of the problems used at Michigan State, were most helpful in providing perspective in the early stages in the development of the Alternative Curriculum.

There has been little that could be lifted directly from the programs of other institutions and applied unchanged to the Rush program. The Rush faculty had to customize the innovations to adapt not only to conceptual differences, but primarily to the constraints of the configuration of available faculty. For example, the decision to integrate biochemistry, immunology, and microbiology, and the later decision to make this the first unit in our first year, was the outcome of a series of decisions based on available resources, optimal timing relative to activity in the regular curriculum, and additional organizational considerations. This in-

house development of the program by Rush faculty has led to a sense of ownership which in turn has been a strong motivating factor for their continuing involvement and continued participation.

Rationale, motivation, and major incentives for initiating the alternative curriculum

The traditional approach to medical education has failed to respond to the rapid growth of medical science information, or to the profound changes in attitudes by patients and society toward physicians and medical care. Over the years, the American medical curriculum has become fact oriented, emphasizing rote memory, and giving little attention to the application of knowledge or to the development of problem-solving abilities during the preclinical years. Students see themselves as sponges required to soak up as much information as possible, with little opportunity or encouragement to think creatively. Critics have claimed that students spend the majority of their time acquiring vast stores of knowledge, much of which is outmoded or forgotten before they graduate. Students have been increasingly disaffected by their introduction to medical studies. There is little opportunity or encouragement for them to think creatively. They are not exposed to the excitement of discovery or the challenge of problem-solving. They do not attain skills necessary for life-long learning or critical inquiry. During the clinical years, bedside, patient-oriented teaching by faculty has diminished. The students do not develop sensitivity to individual human needs.

A core of faculty and administrators at Rush became convinced of the inadequacies of the traditional approaches to medical education, and were attracted to the problem-based model. Problem-based approaches shift instruction from didactic to inductive, and as such recognize not only the importance of cognitive content, but also problem-solving skills and the professional learning process itself. The use of the clinical problem as the focus for instruction was based not only on the concern for retention of learned material, but also on the need to apply the information in the clinical environment. Educational research has shown that the more closely the learning conditions can simulate the setting in which the learned material is to be applied, the greater will be the likelihood of successful transfer of knowledge and skills.

Major incentives for the development of the Alternative Curriculum were the anticipated personal satisfaction of trying to improve the process of medical education in a major way, and the hope that in so doing we would bring joy and excitement to students participating in the educational experience.

The faculty participating in the initiation of the new program had all had extensive experience in traditional teaching approaches. They were responding to their own sense of frustration, and to a hope that an approach could be developed which would not only benefit the students, but would make their own roles as teachers more fulfilling.

How the track was initiated and organized

The converging of three areas of activity led to the initiation of the parallel track at Rush Medical College. These were 1) efforts in faculty development, 2) a study of problem-solving methodology by a member of the Dean's Office, and 3) the cessation of the off-campus program for first-year medical education.

Regarding faculty development, the Dean's Office, through Gerald S. Gotterer, Associate Dean for Medical Student Programs, arranged a day-long workshop, in the spring of 1982, for all faculty who were teaching in the traditional preclinical curriculum. The objectives of this workshop were to introduce the faculty to the concepts of problem-based learning, and to have them experience some of the techniques used. Dr. Howard Barrows provided the keynote address, and in small groups the faculty worked through some clinical problems in Dr. Barrow's Problem-Based Learning Module ("ProBLeM" book) format. This workshop not only served to make members of the faculty aware of alternative approaches to medical education, but it also stimulated several of them to volunteer to serve as charter faculty for the Alternative Curriculum.

The second significant factor in the development of Rush's program was the decision of Dr. Harold Paul, then Associate Dean and Assistant Vice President for InterInstitutional Programs, to make an in-depth study of the problem-solving method of teaching. Working with Dr. James Farmer, as mentor, consulting with Arden Grotelueschen and with J. Broudy (all professors in the College of Education of the University of Illinois at Urbana), Dr. Paul examined the literature relating to problem-solving, and critically reviewed the research supporting the various points of view

represented. This study was important in establishing comfort with the philosophy and direction of the new Rush program.

Finally, the recent decision to terminate off-campus, first-year programs provided both a psychological and a financial boost to the initiation of a new program of study at Rush. For some fifteen years, about 30 students, out of each class of 120, have carried out the first year of medical-school study at either the Knox or Grinnell College campuses, outside Chicago. These students then returned to Rush to enter the regular second-year curriculum. Each college was reimbursed for the special expenses associated with instruction in this program. There were a variety of reasons for the development of this off-campus, one-year program. Among them was the fact that larger classes could be enrolled while improved basic science facilities at Rush were under construction. Further, the program represented an experiment to see whether exposure to rural and small-town practitioners might lead to increased interest in the primary care specialties among the students.

The decision to terminate the off-campus program provided a significant allotment of institutional money—approximately $280,000—which could be made available for the Alternative Curriculum. Because we have, so far, been unable to attract outside funding, these institutional resources have been the sole support for the Alternative Curriculum. Termination of the off-campus program helped in another way to open the door to the Alternative Curriculum. A spirit of innovation has always been a part of the atmosphere of Rush University and Rush Medical College. The termination of the off-campus program left an open niche for other innovative approaches to education in the health professions. The administration was therefore receptive to suggestions for alternatives to traditional approaches to medical education.

The initial decision to seek the adoption of an alternative curriculum was made in the Office of Medical Student Programs of the Dean's Office of the Medical College. Discussions with the dean and the president of the University led to the decision to take the funds budgeted for the off-campus program and utilize them to support a new, preclinical curriculum, but only on the condition that the proposal received the endorsement of the relevant department chairpersons, the Curriculum Committee, and ultimately the Faculty Council—the senior representative governing body of Rush Medical College.

The gaining of broad acceptance of the proposal for an alternative curriculum was conditioned on overcoming biases which existed as a result of a prior institutional experience with an independent-study program. That program had existed for a small number of students as an add-on to the traditional, lecture-based, preclinical curriculum. The primary objections to the program were based on the uncontrolled, seemingly constant, and unreimbursed time demands on the teaching faculty. Many considered the new proposal to be simply a variation of the previous independent-study program.

Consequently, in order to gain acceptance and cooperation, funds for the Alternative Curriculum were directly allocated to the participating basic science departments. The relative amount allocated to each department has been roughly related to the extent of the participation by faculty from the particular department. Although the total amount available does not fully compensate the departments for the actual time committed, the approach has resulted in a more favorable view of the Alternative Curriculum.

However, in order to protect faculty time for research and for teaching in the conventional curriculum, the department chairpersons insisted that faculty should not be required to teach throughout the year in the Alternative Curriculum. The program therefore clustered the time when faculty from particular departments were to be scheduled. This accounts for the sequencing of material as outlined above, and for the failure to achieve more extensive integration across disciplines.

Although the willing participation of basic science resource faculty was ensured by direct departmental funding, participation of clinicians was a different matter. The Department of Internal Medicine, with major responsibilities in the second year of both of the pre-clinical curricula as well as the clinical curriculum, was an area of major concern. The adoption of the Alternative Curriculum coincided with the transition in leadership of this key department. The new chairman, Dr. Roger Bone, was thoroughly committed to the principles of a problem-based curriculum, and cooperated fully in developing a plan for addressing the staffing challenges posed by the alternative program. Sufficient faculty with similar strong commitments to the new approach were assigned to assist in problem selection and development, to serve as resource faculty, and partially to meet the need for clinician facilitators. The initial year of the program required facilitators at a level of only three quarter-equivalents. With the program at its current full capacity of 36

students (18 in each year), a total of 18 quarter equivalents are required. This manpower problem was resolved by utilizing faculty in a Rush-run, rapidly expanding Health Maintenance Organization, and faculty from affiliated hospitals. These physicians were well qualified, and anxious to participate in the teaching program, and have played an important role as group facilitators.

History-taking and physical examination skills were taught by utilizing patients and staff from an affiliated hospital which was new to the Rush system and had not been involved in instruction in the traditional curriculum. It was not necessary, therefore, to encroach on the patients and staff traditionally used in the regular curriculum.

During the fall of 1984, when the alternative track was in its first year, Rush Medical College underwent its scheduled LCME accreditation visit. The accreditation team found the new program to be "an area of positive educational experimentation which is timely and imaginative". They did express concern about certain areas, and they limited the size of the program to no more than 18 students in each class until the program was further reviewed during a site visit scheduled for the spring of 1988. Original plans, as endorsed by the Faculty Council of the medical college, had called for 32 students in each class – four groups of eight students. The limitations posed by the Liaison Committee resulted in a change in design to three groups of six students each. In retrospect, 32 would probably have been too high a number, but 18 is possibly less than the program could comfortably handle with the resources currently available.

Issues for further development

An innovative program must incorporate assessment and modification as an integral part of its plan of development. In the Rush program this has occurred through frequent monitoring of scheduled sessions, most commonly by detailed observation by project staff. Debriefing of students, and meetings of faculty and students are also utilized for ongoing monitoring. In addition, the program undergoes periodic external review by the Committee on Educational Appraisal of Rush Medical College, a standing committee charged with evaluating the quality of all teaching within the college. Excellent critique and positive support have come from these reviews.

In general, it can be stated that the major problems, those requiring significant intervention, have occurred in those parts of the curriculum involving faculty who have not been adequately indoctrinated to the unique philosophy and approaches used in the Alternative Curriculum, or who are not committed to the special objectives of the program. We have found it important, for example, that students not receive mixed messages about expectations from them within the curriculum. Rote memory learning cannot be reduced for students in the Alternative Curriculum while faculty hint that the reductions will result in poorer preparation than that provided by the conventional curriculum. The subspecialist expecting detailed factual knowledge, usually more appropriate for a fellow rather than for a second-year medical student, will undermine the program's attempt to focus on problem-solving and self-directed learning, and will send the student back to memorizing from standard text books.

We are concerned about the impact that NBME examinations will have on the development of alternative track programs, not only at Rush, but at other institutions as well. At Rush we have placed considerable weight on developing a special system for evaluating student performance within the context of the Alternative Curriculum. As noted above we have emphasized assessments of the students' abilities to apply knowledge and to analyze problems.

The perception that students must not only pass, but perform well on the NBME Part I examination strains the objectives of the Alternative Curriculum. The issue of performance on NBME examinations goes beyond the Rush Medical College requirement, which calls only for passage of Part I. The increasing attention to performance in examinations of the NBME in the assessment of applicants for residency positions will place special stresses on students in all curricula which downplay the importance of memorizing large bodies of information, but rather stress the skills of learning and using information.

Thoughts about the optimum use of resource faculty time have undergone considerable revision since the initiation of the Alternative Curriculum. Originally, periods of totally unstructured time were scheduled. Students were to make use of this time as their learning needs dictated. During these periods, hours were set aside for each resource faculty member to be available for consultation by individuals or small groups. But students did not take advantage of this time.

The program has since experimented with various approaches to the use of this time and is starting to reach consensus. The students have expressed a preference for being provided a framework with which to organize their study. The optimum approach for the Alternative Curriculum seems to include the resource faculty providing informal presentations which draw on the issues raised by students in their case discussions, and which go on to provide the conceptual framework for further study. We have attempted (on the whole, successfully) to avoid the classical lecture format. We have preferred to retain the opportunity for dialogue and Socratic inquiry among students and faculty.

Evaluation of the Alternative Curriculum will receive increasing attention as the program achieves stability. Rush Medical College has received a grant from the National Fund for Medical Education to study the students enrolled in the two different preclinical curricula. The study design involves the administration of comprehensive batteries of measurement instruments to the class at entrance, at six-month intervals during the first two years, and yearly during the last two years. Additional, follow-up data will be collected during the first two years of postgraduate education.

This design replicates that used for a longitudinal study of medical students initiated at Rush in 1982. The instruments will obtain information on demographic, attitudinal, personality, psychiatric, and social network variables. Subsequently, measures of academic and professional achievement, and career choice will be obtained. This study seeks to learn which students function better in the different curricular formats, and what impact the different formats have on the students' professional development.

In addition, we hope to obtain measures of the relative effectiveness of the two tracks in preparing students for their professional careers. The Rush program seeks to develop improved measures of clinical competence in order to assess the effects of the innovative curriculum on clinical performance. Performance on NBME examinations will certainly be used as one measure of comparison, but as noted above, this examination focuses on only a limited area of physician competence. The traditional approaches to evaluating student performance during clinical clerkships do not effectively measure the skills which have received emphasis in the innovative curriculum, such as problem-solving, integration of basic science information, and self direction in learning.

We hope to participate in the development of valid and reliable measures of such skills, and to introduce them into the assessment scheme for Rush Medical College students. We thereby hope to achieve a more broadly based comparison of the merits of the two very different approaches to preclinical instruction and learning.

An additional point should be made about the governance of the Alternative Curriculum. The program is administratively directed from the Dean's Office, in the Office of Medical Student Programs. The program has been run, however, in a manner which fosters group ownership of the program by the participating faculty, and also, to a more limited extent, by the students. Inclusion of material in a learning guidebook, or the selection of a clinical case syllabus, must be justified to others outside the discipline covered by the guidebook or case. Such dialogue among faculty, basic scientists, and clinicians concerning the details of the medical school curriculum is unprecedented at Rush. Though our experience has been limited, we are convinced that a sense of collegiality and program ownership, which fosters such interchange, is important to overcoming the parochial attitudes which have for so long deterred critical review and modification of medical education.

The Alternative Curriculum will be subject to formal review at the end of its first six years. Although the criteria for that review have not yet been established, we have begun to put in place a plan for program evaluation. One aspect of this will be the establishment of an intramural Evaluation Committee comprised of department chairpersons who are not directly involved as faculty in the program.

There is no commitment about the status of the Alternative Curriculum beyond the six-year period. Whether the program will be continued, expanded, or integrated into the traditional track will be determined at that time. We anticipate that whatever success the Alternative Curriculum program might have, the traditional track will not be abandoned.

The degree to which the alternative curriculum has influenced the traditional track

Despite its short existence, the Alternative Curriculum has already had some influences on the traditional curriculum. In the physiology course in the traditional curriculum, for example, a clinician used to be asked to present a clinical case to illustrate the clinical applicability of physiological principles after the presentation of the

relevant content in the lecture-based course. Now, the case is presented at the beginning of the teaching unit to serve as a framework for learning. The case is again discussed after the lectures in the unit have been presented.

Further, cases used for analysis in the Alternative Curriculum are being used to introduce examination questions in the traditional curriculum. Although the testing is still multiple choice, there are increased efforts to make the questions address problem-solving skills.

In the biochemistry course, one of the major lecturers who is involved in both curricula is reducing the number of lectures, dividing the class into large groups to cover some material by interactive discussion, and placing greater emphasis on students' self-directed learning through reading. In addition, more case material will be used to illustrate biochemical principles.

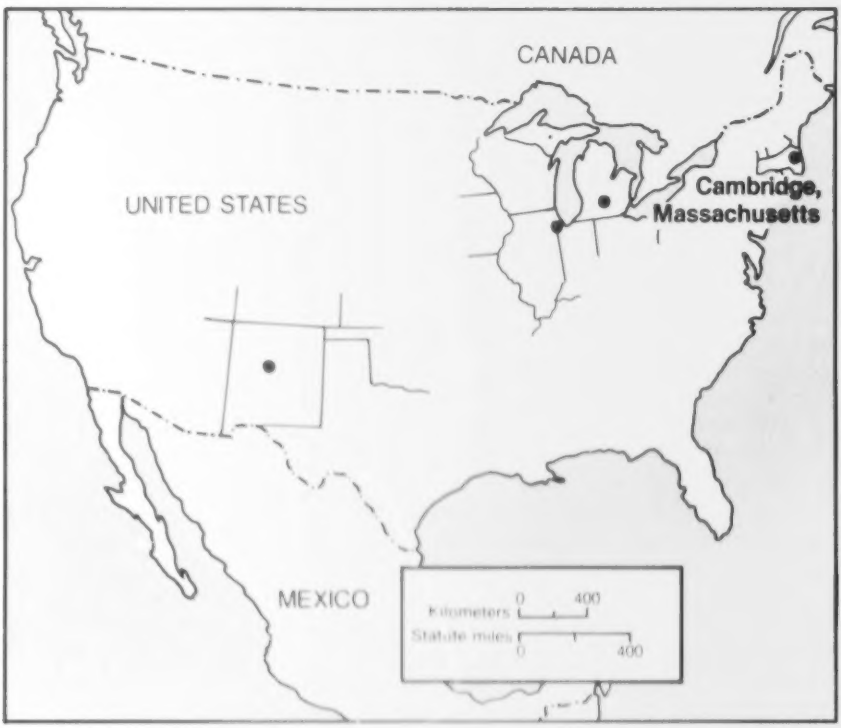
The use of simulated patients was first introduced into instruction in the Alternative Curriculum. Simulated patients, including many of the same simulations used in the Alternative Curriculum, were introduced this past year into the regular curriculum for instruction in patient-interviewing skills.

There were major changes in the second-year course in pathophysiology. This course was changed from being primarily a lecture course to one utilizing the small-group format for about three-quarters of the course (25 to 30 students per group). In addition, clinical vignettes are used to stimulate group discussion of underlying basic science issues. Faculty involved in this change are not participating in the Alternative Curriculum, and its contribution to these changes is not as clearly evident as with the other changes cited. However, we like to think that even here the Alternative Curriculum may have been a catalyst for change, or may have assisted in creating an institutional climate which was more accepting of such change.

Considering the brief existence of the Alternative Curriculum, these changes in the traditional curriculum reflect a rapid transfer of some of the philosophy and the methodology developed and used in the context of the Alternative Curriculum. This rapid transfer is no doubt due to the fact that most Alternative Curriculum faculty maintain significant roles in the traditional curriculum.

Conclusion

The Rush Alternative Curriculum is still in its formative stage. It is nevertheless evident that the design of the program has been successful in shifting the focus of the preclinical educational process. The Alternative Curriculum emphasizes the application of scientific knowledge in clinical problem-solving, and the development of self-directed learning. These are two domains which have characteristically been deficient in traditional medical school curricula. The program has been shaped by the collaborative efforts of a cadre of enthusiastic faculty who have been flexible and creative in their approaches. While development of the program continues, this cadre is addressing the challenging problems both of program evaluation, and the assessment of whether the changes in focus which are built into the new curriculum will result in changes in attitudes, skills, and approaches in the young professionals we are training.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Harvard Medical School, USA

The new pathway to medical education

Myra Ramos and Gordon T. Moore.

Harvard Medical School has developed a New Pathway to general medical education. Broadly conceived, the New Pathway represents our school's attempt to re-think and re-form its approach to the education of medical students. The prototype of the new approach is a separate track called the Oliver Wendell Holmes Society.

Principal characteristics of the new and traditional programs

The Oliver Wendell Holmes Society (OWHS) is the third track to the M.D. degree currently available to our students. It is brand-new; the first class entered in September 1985, and much of the program is still in the planning stage. A Health Sciences and Technology curriculum (HST) was established as an innovative, second track in 1971 to prepare physicians with a strong base in quantitative science. HST has a separate program for the first two years, but shares clerkships with the traditional program – unlike OWHS, which will include newly-designed clinical clerkships. The three tracks enroll the following numbers:

	Traditional	*HST*	*OWHS*	*Total*
1984–85	140	25		165
1985–86	116	25	24	165
1986–87	99	28	38	165

The new track (OWHS)

Students

Students admitted to Harvard Medical School (HMS) for the fall of 1985 were invited to volunteer for participation in OWHS. Approximately 70 did so; and 24 were chosen by stratified random selection, so as to resemble the overall class with regard to gender and minority status. Of the charter group, 16 were men and eight were women; five were members of minority groups. They were graduates of 15 colleges, and their ages ranged from 19 to 35 years. Fourteen were college science majors, and ten had majored in the humanities and social sciences. After four months, one student

transferred into the traditional curriculum; his place was not filled. The 38 students who will enter the second OWHS class in September 1986 were selected by the same method from approximately the same number of volunteers.

Faculty

OWHS is headed by a Master, who bears overall responsibility for its faculty and students. In its first year, the faculty roster included sixteen tutors – four for each of the four first-year basic science blocks – plus several backup tutors. The tutors were recruited from all departments, came from all faculty ranks, and represented a mix of clinicians and basic scientists. Twelve clinicians served as preceptors, in teams based at four affiliated teaching hospitals. Over 100 individuals served as curricular planners and as expert resources.

Design features

The New Pathway approach, as currently expressed in the OWHS, is intended to provide the perspective of a single faculty looking at the entire span of general medical education. This is in contrast to the "subcontract" approach, which places discipline-based departments in charge of discrete, separately-planned curricular components. Important design elements of the new approach include the following:

- Emphasis on the attitudes, skills, and knowledge required for all physicians regardless of future specialty, and careful selection of essential knowledge to avoid information overload.
- Close student-faculty contact in small groups, and an environment in which students and faculty learn together.
- Interweaving of clinical and basic science elements throughout the curriculum.
- Reduction of lecture time, and use of active educational methods such as small-group tutorial discussions.
- Emphasis on topics such as health-promotion and disease-prevention, and on skills such as information management, critical analysis, self-directed learning, and self-assessment.

One organizing principle of the New Pathway has come to be known as the "60-40 rule". Sixty percent of the curriculum is attended in common by all OWHS students, while the remaining 40% is available for electives and individual pursuits, including a

project thesis requirement. One of the lessons of the first year is that OWHS teachers seem to have the same abhorrence of an apparent "vacuum" as do teachers in traditional programs. The tendency to chip away at the unscheduled time grew steadily throughout the year, until the students began to joke about the "90-40" rule. Consequently, a small Operations Committee of staff and faculty was formed to oversee the schedule and to screen requests for additional exercises.

Curriculum

The common portion of the first two years of the curriculum, attended by all OWHS students, comprises six consecutive interdisciplinary basic science pathophysiology blocks—The Body, Metabolism of Matter and Energy, Identity and Defense, Life Cycle, The Nervous System and Human Behavior, and Human Systems—and a longitudinal component called Patient/Doctor. The central learning format is the problem-based tutorial group. Each group is composed of six students and one faculty tutor. The tutorials for the six blocks are held three times a week, and use problems (usually paper patient cases) as stimuli to learning the underlying basic science and pathophysiology. Concurrently, the Patient/Doctor sessions are held once a week. Correlated laboratory exercises are scheduled regularly.

There are five lectures per week—four related to the basic science block, and one to the social science aspects of the Patient/Doctor component. One of the knottiest pedagogical problems in the first year of the program has been how to relate the lectures optimally to the work of the tutorial groups, so as not to rob the tutorials of their own discovery potential. In general, students seem to prefer the lectures to be presented to them after they have wrestled with the material in the context of a case discussion. No magic formula has been discovered, although flexibility on the part of the lecturer seems to be a particularly valuable asset in this system.

One full afternoon per week has been set aside throughout the four years for the Patient/Doctor portion of the curriculum. This portion emphasizes 1) the acquiring, recording, and presenting of clinical information, 2) medical ethics and the social science components of medicine, and 3) patient/doctor communication. Activities in the first year included tutorials on Patient/Doctor topics, laboratories for clinical skills, visits to special health care

sites, and contacts with patients. In this component, two students work with one clinical preceptor – a relationship that will continue throughout medical school – while tutorials are conducted in groups of three preceptors, six students, and a team psychiatrist.

The third and fourth years will include ten months of required clinical clerkships; two months of advanced basic science/ pathophysiology; one month of advanced medicine subinternship; at least two months' work on a written independent project; up to two months for vacation and/or travel; and the remainder of the time in electives.

The New Pathway clerkships will be based in our affiliated teaching hospitals (Harvard does not own a "university hospital"). They will encompass the traditional disciplines, but will also include the interdisciplinary Ambulatory Care (a requirement for OWHS students but not for others) and Women's and Children's Health – a two-month combination of pediatrics and obstetrics/gynecology with a healthy infusion of epidemiology.

Although the clerkship design groups were largely discipline-based, each group included one clinician from another specialty, as well as a basic or social scientist. The groups were encouraged to think from scratch in designing clinical experiences which would be optimal for medical students who would be accustomed to accepting responsibility for their own learning. The designs from these groups are undergoing intensive review, and staff will coordinate the overall implementation effort, as was done for the blocks in the first two years.

At this early point (clerkships will begin in July of 1987) several themes seem to characterize the designs. They are more student-centered, providing more contact with faculty preceptors and less total immersion in the ward team. They focus on those aspects of the discipline which all physicians should know. And they define a "core clinical curriculum", with the expectation of providing paper cases, computer stimulations, tapes, etc., to supplement the vagaries of patient admissions. In addition, each planning group has incorporated ambulatory experience into its clerkship. Perhaps the most unusual and exciting result of the design process has been the collaboration among clerkship chairpersons from different disciplines, who meet monthly to discuss coordination of approach and content.

Information management

The educational environment of OWHS has been noticeably affected by the incorporation of personal computers into the daily educational program, curriculum development, and administration. Initial efforts were directed to providing students and key faculty (including tutors and preceptors) with personal computers, assisting in their use, and establishing an electronic mail system. The computers are also used for bibliographic reference searches and word processing. In addition to the individually assigned terminals, seven terminals in a central location are available for use by students, faculty, and staff. Several educational modules are in the process of development and testing, including self-directed learning programs in acid-base metabolism and cardiovascular physiology, and a test-item data bank for self-assessment. Development of a curriculum data base system is now a high-priority project.

Each OWHS student has been assigned a particular reference librarian at the Library of Medicine to answer questions, to provide assistance in locating special reference material, and to guide the development of library skills. The faculty has observed that OWHS students appear to utilize a greater variety of references than those used in the standard curriculum.

Student evaluation

In the OWHS curriculum, tutors and preceptors provide the students with ongoing evaluation and with recommendations for remedial assistance. A written examination of the traditional type is given at the midpoint and at completion of each block. Two of the three basic-science blocks completed in the first year also utilized a special exercise (developed at the McMaster School of Medicine) known as the "Triple Jump": the student approaches a newly-presented problem, develops a hypothesis and learning agenda, and spends a limited amount of time on consulting references and other resources; and then presents an analysis to the examiner. In one block, a practical laboratory component made the exam a "Quadruple Jump".

In accord with present school policy, OWHS students will pass Part I of the examination of the National Board of Medical Examiners for promotion, and Part II for graduation.

Program evaluation

OWHS students will be studied at intervals during their progression through medical school, and their performances compared to those of the students in the traditional curriculum. The goal is to compare the effectiveness of the two curricula in achieving cognitive objectives, and in preparing students to be competent, caring physicians, careful investigators, and self-directed learners. A comparison will also be made between student and faculty satisfaction with the new track and that with the traditional track.

Faculty development

Conducting a tutorial group requires different skills from lecturing, or even leading a traditional seminar. Some non-physician faculty members have been tentative about their abilities to use clinical problems as the basis for tutorial sessions. All tutors have expressed anxiety about their competence to teach in fields other than their personal specialties. And almost all have experienced difficult in restraining the impulse to "tell the students what they need to know", and in allowing the students to engage in their own process of discovery. These problems have been addressed through faculty development workshops and other exercises. The methods include practice tutorials using Harvard premedical students; debriefings of tutors in a block nearing completion in the presence of tutors for the next block; and pre-block meetings by tutors to discuss objectives and strategies for each case or problem. With this support system, virtually all tutors successfully carried out the transition to the new teaching style.

Organization

Each curricular block is organized by a Curricular Design Group (CDG) which defines the learning objectives, determines whether particular material is most effectively presented as lecture, problem case, or laboratory, and develops a list of references and expert resource faculty. They define content, write tutorial problems, establish the series of accompanying lectures and laboratories, and prepare a student workbook and a tutors' guide.

The chairpersons of the CDGs meet every second week to coordinate both the content of the blocks and the implementation and evaluation of the curriculum. These meetings are also attended

by faculty members responsible for the development of information technology and student evaluation, and by professional staff involved in curricular and faculty development, and program evaluation. A small Operations Committee meets every second week to handle immediate issues and problems, to review the readiness of each curricular block to begin, and to oversee the students' Master Schedule.

A Faculty Steering Committee, chaired by the Dean of the Medical School, meets monthly to review the progress of OWHS, to discuss policy issues, and to consider the relationship of OWHS to the rest of the school.

The traditional program

Curriculum

The curriculum followed by the majority of HMS students is quite traditional in format. The first year is composed of basic science courses which are departmentally organized and presented.

In fall and January of the second year, students take systems-based pathophysiology courses, followed in the spring by Microbiology and Introduction to Clinical Medicine. The course offerings and credit requirements in the areas of the social, behavioral, and quantitative sciences have recently been increased.

The primary educational formats are lectures, conference groups, and laboratories. (Figure 14 compares the use of the different formats in 32 weeks of the OWHS and the regular curriculum.) Considerable effort has been invested, over recent years, in improving the presentation of courses and responding to the criticisms and suggestions of students. With few exceptions, the courses are very good to excellent. But regardless of the quality of individual components, the endemic problems of the current preclinical system are familiar to all: the difficulty of coordinating discrete departmental curricular offerings; lack of opportunity for students and faculty to get to know each other; a passive learning style which students find regressive and enervating; a lack of opportunity for students to work with classmates, poorly preparing them for teamwork and collaboration in the clinical setting; an overwhelming diet of facts, which tempts students to concentrate on passing exams; and a pronounced separation of basic and clinical sciences, which leads students to endure basic science as a hurdle to

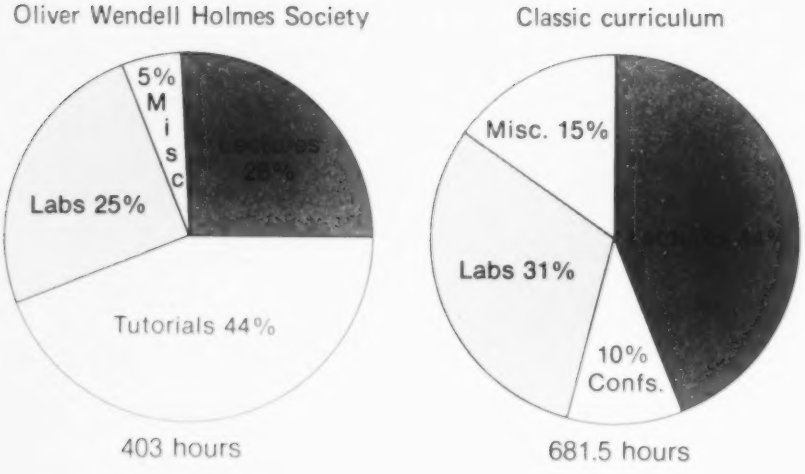

Fig. 14. Distribution of time devoted to different educational formats for the OWHS and classic curriculums

reaching "the real thing" patient contact rather than to see the basic and clinical sciences as inextricably and fascinatingly intertwined.

Preclinical course examinations tend to emphasize rote recall questions. However, a recent series of workshops on improving examinations has encouraged an increasing number of faculty to utilize essays and problem-solving items.

The third year consists of the standard clinical clerkships. No ambulatory care experience is required. The clerkships incorporate students into the ward team as co-deliverers of patient care. But there is a lack of focus on student needs; a concentration on tertiary care, with a tendency to emphasize rare and esoteric conditions; a lack of time for students to read about their patients; a lack of structure, with an unpredictable mix of patients; and a lack of opportunity to observe the life of the practicing physician.

The fourth year is available for electives, independent study, and research and study in other settings.

Organization

A Curriculum Committee is responsible for the educational program leading to the M.D. degree. The committee includes faculty representatives from each of the school's 23 Departments, two student representatives from each of the four classes, and a number of ex-officio members. This sizeable group meets monthly during the school year to vote on proposals for new courses, to review suggested changes in graduation requirements, and to consider major curricular policy issues.

A Committee on Educational Evaluation sponsors and publishes student evaluations of courses and clerkships, conducts faculty review of large-enrollment preclinical courses, and has recently initiated "site visits" of clinical clerkships.

These committees meet their responsibilities admirably. But the larger issues of curricular articulation and overall design have remained intractable to solution because of the decentralized educational structure.

Rationale, motivation, and major incentives for initiating the new track

The current Dean of Harvard Medical School, Daniel C. Tosteson, has long been interested in new approaches to undergraduate medical education. Upon his appointment as HMS Dean in 1977, Dean Tosteson assigned an extremely high priority to the education of medical students and promptly launched a series of initiatives which laid the groundwork for significant curricular innovation.

The Dean had hoped from the outset that the extensive resources of the HMS faculty might enable the school to achieve a collegial organization for medical education, which would cluster students and faculty into several Academic Societies. Accordingly, a number of Societies were created at HMS, beginning in 1978. But although the Societies promoted social interaction among faculty and students, they remained extra-curricular in nature and did not take on the academic component the Dean had originally envisioned.

In 1979, the Dean introduced a series of activities intended to stimulate interest in medical education and to introduce the HMS faculty and students to new pedagogical ideas and approaches. In June of that year, the administration convened a workshop on medical education in the format of an HMS faculty-student retreat.

In September 1979 the school sponsored a "Symposium on Medical Education" with outside speakers. The workshop/retreat defined educational goals for HMS and analyzed how our learning environment fostered or hindered their achievement. The resulting recommendations included the following: "greater student participation in the learning process; the fostering of continuing faculty-student relationships; the development of educational objectives in both preclinical and clinical courses; the identification of core learning material; improved curricular articulation; greater emphasis on the development of interpersonal skills; and reduced reliance on the lecture format, with increased use of small-group learning situations."

The Symposium on Medical Education presented a roster of challenging speakers. Causing a particular stir among our faculty were Paul Beeson, who urged a redefinition of core knowledge and a dramatic reduction in the amount we expect students to learn; and John Evans and Vic Neufeld from the McMaster School of Medicine, who introduced us to the concept of a problem-based curriculum. The Chairman of the Curriculum Committee subsequently summarized the main lessons of the Symposium: "reducing the overload on memory; providing more unscheduled time; encouraging more critical thinking; pruning elective offerings; increasing the number of required clinical courses; offering more behavioral, social and statistical science; providing more structure to clinical teaching, with later entry into the ward team structure; and encouraging further subdivision in the medical school along the lines of the HST program or the Societies, in order to increase student-faculty contact."

The next workshop, in 1980, reviewed progress in addressing the deficiencies identified the preceding year. The workshop featured small-group discussions of "The HST experience with a group of faculty members and 25 students as a possible model for extension"; and "Can the Societies move beyond their purely extra-curricular role to form more of a base for medical education?" Symposia in subsequent years addressed "Information Overload and Information Management" and "Rethinking the Continuum of Medical Education".

Encouraged by this climate of educational reassessment, our Curriculum Committee reviewed the four years of medical school, and attempted to arrive at recommendations for needed changes. But the results were marginal.

Following these unsatisfactory attempts at curricular reform, the Dean continued to try to modernize medical education to meet the challenges of expanding information and advancing technology.

How the track was organized and initiated at the outset

In May 1982 Dean Tosteson presented a proposal for a new, seven-year pathway to the M.D. degree at HMS, to be offered to 25 students in the fall of 1983 as a demonstration project.

The proposed program, the New Pathway, with no course prerequisites for admission, would commence at the end of the second year of college, and seven years later would graduate individuals qualified to enter the second year of residency programs in all clinical specialties. The curriculum would be 50% shared and 50% elective; the shared portion would feature problem-solving and the case method, as well as self-directed learning and self-assessment. The first four years of the program would focus on basic science, and the last three years on clinical science; but elements of both would be interwoven throughout the curriculum. A thesis would be required in each segment. The program would rely on close personal relationships between students and faculty working together in small groups, and would emphsize development of insight and emotional maturity.

The Dean described this outline as a "personal first draft". He said the program was intended to address four major issues that were being dealt with "suboptimally": character, cognitive style, content, and continuity. He emphasized that he hoped the new pathway would be the "beginning of a general transformation of the style of learning at HMS".

In discussions following the Dean's presentation, concern focused on the temporal aspects of the proposal—the seven-year continuum, and particularly the issue of early admission. That issue was to dominate consideration of the proposal for the next year.

Social, economic, and political forces supporting and resisting change

Clearly, the most important single force behind change was the Dean himself. But there were other sources of support within the school. A number of the HMS faculty had always been committed to improving the teaching of medical students, and now the cumulative effect of the workshops and symposia had fostered a climate in which

educational experimentation could be favorably considered. Also, as a result of conversations which the Dean had conducted prior to launching the New Pathway proposal, key members of the faculty and administration were committed to elements of that proposal. But the plan contained three key features, and the initial supporters were not equally enthusiastic about all three.

The first feature was the seven-year continuum – a program of general medical education which would include the second two years of college and the first postgraduate year of residency training. That feature – particularly early admission – attracted almost unanimous opposition from HMS students and faculty. The students objected that valid admissions decisions could not be made regarding less mature individuals; that early admission would deprive the school of the contributions of older students with diverse educational and career backgrounds; and that it would discriminate against minority students, a number of whom choose late in college to enter medical school. The faculty recalled their college years with nostalgia, and protested against any invasion of that four-year period.

The second feature was the establishment of a demonstration project with 25 students. This was roundly debated during the ensuing year. Many faculty, most students, and some administrators would have supported a proposal for a substantial curricular innovation for all students, but they felt that a radically-altered program for a few was elitist and would divert resources from the school's commitment to its entire community of students.

The third feature involved a new approach to medical education, including problem-based learning, reduced lecture time, use of the case method, and use of computers. Although many faculty were content with the existing educational arrangements, many others supported innovation – partly because each of the latter saw the intriguing but incompletely defined new program as an opportunity to incorporate his or her own favorite causes.

An unexpected source of "support" arose after a news story about the New Pathway appeared in the medical school newsletter. The story was picked up by the Boston Globe, the New York Times, and the wire services. Suddenly, we were deluged by applications from college freshmen around the country, all wanting to enter the new Harvard program that emphasized character and had no course prerequisites!

Strategies developed to overcome barriers to change and to develop support forces

Following the May 1982 announcement of the New Pathway, Dean Tosteson designated a Planning Group, and charged it to define the attitudes, skills, and knowledge that all Harvard Medical School graduates should possess, and then to design the curriculum that would achieve those goals. The group was composed of prominent members of the HMS family, some of whom were already supportive and some whose support it was important to obtain. The group, chaired by the Dean, gathered regularly for three-hour breakfast meetings, gradually developing a sense of mutual trust as well as a strong commitment to trying something truly innovative.

The Dean convinced the Planning Group that a pilot program was the correct course of action – that change for all students would be so diluted as to be meaningless. Also, a separate track of limited size would make it possible to bypass the "departmental subcontract" system in favor of centralized planning, coordination, and control. An additional appealing argument in favor of the separate track was that any mistakes would affect only a few student volunteers; the large group of students would be protected. Although the Planning Group supported the idea of a separate track, they only reluctantly concurred with the seven-year concept.

The group drafted both a statement of objectives and an outline of a curricular plan, both of which strongly resembled the Dean's original proposal. They distributed the drafts to a widely recruited group of students and faculty for comment. The responses resulted in a more refined set of objectives, although the issue of early admission/seven-year continuum had dominated and interfered with much of the discussion.

Faculty and student opposition to early admission continued unabated; only two or three individuals who had themselves completed such programs spoke up in favor of the seven-year continuum. By the spring it had become clear that this aspect of the plan would have to be sacrificed in order to salvage any hope of gaining approval for an innovative demonstration program. Abandoning the continuum concept was a very difficult concession for the Dean to make, since doing so struck at the heart of his vision – a curriculum comprising "the entire span of medical education: the learning goals that all physicians share, beginning with those that are now covered by courses considered to be prerequisites for

admission to medical school and ending with those that are necessary for acceptance into a program of specialty training".

The compromise did not eliminate the continuum concept, but restated it – dividing it into two parts. Part One (the college years) and Part Two (to be carried out at HMS) would be developed "so that matriculation in the first part is not required for admission to the second part". The college years were thus decoupled from the rest of the proposal, preparing the way for the latter's acceptance.

With the politically unacceptable seven years thus reduced to five, concern began to arise regarding the previously-ignored but potentially even more controversial "fifth year" (i.e., the first postgraduate year). In order to stave off opposition, preserve the concept, and gain time, a provision of the report stated that "the form of the final clinical year will depend on relating the new program to the current patterns of graduate medical education."

Still intact, however, was the description of the basic educational approach for the new program during the medical school years. Although the original suggestion of 50% shared and 50% independent work had been altered to a more realistic 60%-40% balance, the approved guidelines for the new learning process were those first proposed by the Dean: "close student-faculty contact, small groups and tutorials, self-directed learning, self-assessment, analytic and problem-solving activities, case discussion, interactive computer programs, the use of information technology, and independent study". No consensus had yet been reached regarding whether problem-based learning would be the principal approach in the new track, or merely one of several elements. Significant concern regarding the methodology would thus appear only later, after this rather vague set of phrases was translated into an actual program.

In order to reassure those who were concerned about a possible drain on the school's resources, as well as those who wanted some objective evidence on which to base future decisions regarding the possible extension of the new track, it was provided that "the program will be financed by external sources of support and will be evaluated by quantitative and qualitative measures".

There was another problem concerning two rather opposite aspects of the program. On the one hand, there was concern that the benefits of the new program might be sequestered, rather than becoming quickly available to all. On the other hand, many faculty worried that if they gave permission for the design of a new track, they would be abdicating all control over future events.

The hurdle of formal political approval is a critical one. The barrier was cleared by an influential Curriculum Committee member, who was respected by doubters and supporters alike. He authored a resolution which included the introduction of a new track for 25 students out of each class; implementation of general principles of the New Pathway; the seeking of outside financial support; and the formation of a group of faculty and students to develop a specific program which the Curriculum Committee would review, and to provide a plan for applying successful components of the New Pathway to a larger segment of the medical school class.

These last points were essential to obtaining faculty suspport. The faculty was willing to approve a demonstration program, fund-raising activities, and the organization of a curricular planning effort, as long as it was not required to sign a blank check, and it was reassured that it would retain oversight authority.

In May of 1984, OWHS was on its way to realization.

The role of leadership, funding and legislative mandate in the planning and development of the innovative parallel track

Leadership

Harvard Medical School is a research-oriented institution which attracts students who excel regardless of the curriculum. Its faculty enjoys a prestigious reputation, regards its traditions with satisfaction, and tends to look inward for inspiration. To engage that institution and that faculty in a major effort at educational renewal requires exceptional leadership not to mention true grit. Five principal leadership elements seem to have been crucial to the process of bringing an innovative track into being:

1) *Dean Tosteson.* His vision of a radically new approach to education is challenging; his dedication to central curricular renewal is respected; and his tenacity is formidable. He chaired the original Planning Group himself, to make visible his personal championship of the project. Throughout, he has insisted on our beginning with what is pedagogically optimal, instead of guessing what will be politically or logistically feasible. He has pushed for bold positions. He has urged the speediest possible time frame. The New Pathway to medical education is his distinctive contribution to the school, and he is determined that it will be a lasting legacy.

2) *The original Planning Group.* These sixteen faculty members invested large amounts of time and energy in agreeing upon and setting forth a statement of necessary educational change, and in helping convince their colleagues of its importance. Their prominence in the school gave credibility to their recommendations and was a major factor in gathering support. Virtually all members of that group are now either OWHS faculty or on the current New Pathway Steering Committee.
3) *OWHS Administration.* Dr. Gordon Moore, Executive Director of the New Pathway, had the difficult and politically exposed task of making it happen of transforming a bold plan into bold reality; and he has done so with enormous energy and imagination. Without him, we might still be discussing the desirability of doing something new. He has been the prime mover in creating the actual prototype of the New Pathway the Oliver Wendell Holmes Society.
4) *The Dean's Group.* The Dean for Academic Programs, with oversight responsibility for all the present curricular tracks, has been charged to bring about a schoolwide consensus on the future shape of education for medical students at Harvard Medical School. The Dean for Students and Alumni has led the planning for the new OWHS clinical component. His personal credibility among the clinical departments is critical to their willingness to implement new clerkship approaches.
5) *The President of Harvard University.* The President has given public and enthusiastic support to the New Pathway initiative.

Funding

A grant from the Josiah Macy Jr. Foundation provided seed money for planning the activities of 1983-84. These included several faculty retreats and the work of the Curricular Design Groups. The list of contributors has also included American Medical International, the Arthur Vining Davis Foundation, the R.H. Macy Foundation, the Exxon Educational Foundation, the Goldsmith Foundation, and individual donors, including Harvard alumni. Hewlett-Packard made a $5 million grant of computer equipment and software development support over a five-year period. In the fall of 1985, the Kaiser Family Foundation awarded a $3 million grant which assured the first three years of implementation. The grant supported,

in particular, program evaluation, content on health-promotion and disease-prevention, and diffusion of the results of the project.

The role of other institutions in helping to develop the new track

As noted earlier, the presentation of the McMaster program at our Symposium in 1979 greatly interested a number of our faculty. That initial contact was reinforced by several visits from the Chairman of the M.D. program at McMaster, who offered us important encouragement, advice, and caution. In the spring of 1983, several members of the PCC Faculty at the University of New Mexico joined us for a planning session on faculty development, and contributed useful and stimulating suggestions. And the Associate Dean for Education from Southern Illinois University presented problem-based learning to an early Faculty Planning Retreat.

Since 1983, a number of OWHS faculty and staff have attended Visitors Workshops at McMaster to become familiar with problem-based tutoring and evaluation. Materials and visits have been exchanged with other institutions which offer problem-based programs. And in March 1986, staff members from problem-based groups at Harvard, McMaster, Mercer, New Mexico, Rush, and Southern Illinois University published their first collaborative newsletter. Overseas visitors from Maastricht and the University of Newcastle have shared their insights and contributed to our understanding of our task.

As we gratefully acknowledge our debt to the support and suggestions of the above institutions and others, we also acknowledge the degree to which our faculty, like many others, is cautious of imported ideas. It is essential that our faculty feel a pride of authorship with regard to the new program, and a conviction that its style and content are appropriate to this school's values and purposes. So we seek simultaneously to learn from other innovators, to maintain long-standing ties with traditional sister schools, and to establish an independent and pragmatic approach, tailoring educational philosophy to what seems to work for us.

Finally, a significant source of assistance has come from another professional school at our own institution. The Harvard Business School offers a course on discussion-group teaching, using the case method. Since 1981, 27 Harvard Medical School faculty members and staff have participated in these sessions; and the alumni of those classes have been strongly represented in the cadre of New Pathway

planners. This teaching development opportunity has brought our faculty into contact with other viewpoints and perspectives, and has emphasized the importance of interactive teaching.

The director of that course has also served on both the original Planning Group and the current New Pathway Steering Committee, helping to provide an invaluable outside perspective.

The degree to which the innovative track has influenced the conventional track

Inevitably, any major change in an institution disrupts the system in both predictable and unanticipated ways – in ways which are often painful, even when the outcomes are positive. The negative aspects of change can be softened by foresight, but they cannot be avoided. We have tried to benefit from the experience of other schools, but have still found ourselves making costly mistakes. On the other hand, some things have turned out surprisingly well. And so it goes.

Some of the disturbances are not unlike those caused when a new baby is born into a family. Resources, both material and psychological, are spread more thinly; and the hitherto secure place of the elder siblings is suddenly placed in doubt. One can reassure the latter that they are regarded and appreciated as warmly as before; but when all the attention (publicity) and gifts (special resources) seem to be accruing to the newcomer, the self-esteem of the other family members suffers. And so, in addition to the more objective concerns about issues like compensation and teaching load, there is the pervasive sentiment felt by many, and expressed openly by a few: "Does anyone still care about us?"

One early, unforeseen, and highly symbolic impact of the New Pathway was that it created confusion about what name to give the traditional curriculum. A number of suggestions ("the old pathway", "regular", "standard") sprang up and were discarded in distaste. The one that has begun to stick is "classic curriculum" — with the obvious implication that the "classic curriculum," like "Classic Coke," may outlast the "new" product.

One of the first resources to feel the pressure of the new program has been teaching power. Although external funding enabled the New Pathway to reimburse departments for the large amounts of time required, excellent teachers could not be cloned. Although some individuals simply added to their teaching load in order to participate in both programs, others were not able to do double

duty. The shift of key teachers from the traditional to the new curriculum (described as "going over") has had a number of results. One was anxiety among entering students because two particular "star" teachers would no longer be directing the traditional courses in their fields. This anxiety was expressed as, "All the good teachers have been stolen by the New Pathway!" creating understandable resentment on the part of the replacements!

An unexpected byproduct of the "loss" of the previous leader and principal lecturer of the Histology course was curricular innovation in the course. Instead of finding another person for all the "vacant" lectures, selected topics were identified as more appropriate for presentation in laboratory-based, small-group discussions. The reception among both students and laboratory section teachers (who thereby gained a more active teaching role) was enthusiastic. The new course director commented, "The New Pathway took the heat off us, and we were able to try something different."

The previous year, the director of the Endocrine Pathophysiology course had experimented with conducting one of the conference sections in a purely-case-based format. Last year he converted the entire course, dramatically reducing the number of lectures in order to present most of the material through case discussions. The second-year Microbiology course introduced two large-group case discussion sessions designed to expand upon material already presented in class.

In addition, a proposal has been put forward by the Department of Anatomy to convert its teaching of histology and gross anatomy into the block format currently used in the New Pathway, and to present this version to the entire school in the fall of 1987.

The pace of change in the traditional curriculum is quite visible, and the experimentation is attributable in part to a general climate of innovation which seems now to pervade the school. Some experiments may reflect an emulation of New Pathway principles; some may represent efforts to show that "the classic curriculum is as good as the New Pathway"; others are simply expressions of an ongoing desire to refine and improve teaching. It does not matter much; it is all good, and it benefits the majority of students who are enrolled in the traditional track.

In fact, last year's "classic" courses went remarkably well, for the most part. The weekly student-faculty lunches in the first semester were marked by good will and very little resentment of the New Pathway students, despite their possession of "perks" such as

personal computers. But the separate curricular programs and lack of opportunity to socialize across tracks created fertile ground for future trouble. Later in the year, the press published enthusiastic statements by OWHS faculty members who found the new program a better way to teach and learn. Students in the traditional track found these statements offensive. As a result, bad feelings escalated into a degree of protest which almost certainly could have been avoided by more careful attention to press interviews and by providing more opportunities for the two groups of students to spend time together.

A belated and angry joint class meeting revealed interesting discrepancies in the self-perception of each group. The "classic" students felt neglected and denigrated, and believed the OWHS students to be privileged in terms of resources and attention, in what they described as "the favorite child" syndrome. OWHS students, on the other hand, although excited and pleased by their program, nonetheless felt keenly the insecurity of participating in an experiment and saw the "classic" students as enjoying the benefits of a tried and true curriculum.

To overcome this divisiveness, students from both tracks will work together over the summer to establish better relationships and to advise the administration on fostering a more collegial cross-track environment next year.

Among faculty, the compensation issue stirred up resentments which had been lurking since the establishment of the HST track years earlier. Faculty members who teach in the "classic" curriculum do so without reimbursement arrangements. It is part of the job. But in the HST program, sizable teaching contributions are acknowledged by compensation to the individual's department. A similar procedure has been adopted by the New Pathway. "Classic" faculty resent this arrangement as being inequitable. To solve this problem, a task force has been proposed to establish guidelines for the amount of teaching which should be considered an intrinsic part of an HMS faculty appointment, as well as guidelines for compensation for extra teaching.

Further development perspective

The Dean's vision for the future organization of the education of medical students at HMS involves the creation of five academic Societies, each with its own faculty and each serving approximately

one-fifth of the entire class. For the core material, each would operate within the same general framework, offering a series of curricular blocks which would be similar for all the Societies.

The move toward this vision is a delicate and complicated process. At one point, the Dean had hoped we might take the inauguration of a new teaching facility (presently under construction and scheduled for occupation in the fall of 1987) as an opportunity for the subdivision of the school into five Societies. But it became clear that such a major decision would take more time.

The major current thrust is the refinement of the OWHS prototype in order to achieve a version that is acceptable to a "critical mass" in the school – notably the department heads, the Faculty Council, and the Curriculum Committee. To achieve this refinement, it is essential to involve the departments in shaping the OWHS curriculum – both to ensure adequate treatment of the various disciplines, and to provide faculty members from the traditional program with a better understanding of what the New Pathway is all about. To that end, special representatives have been designated by the basic science departments to work closely with OWHS faculty planners in reviewing this year's curricular experience. The key issue is how to obtain the benefit of departmental review and input, encouraging an increasing sense of participation and ownership – while retaining OWHS's integrated, interdisciplinary, student-centered, problem-solving approach to medical education.

We are in the midst of creative ferment – both educationally and politically. It is an incredibly exciting period.

Acknowledgements

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Shanghai Second Medical University, China

The problem-oriented basic medical science curriculum track

Li Xue-min and Wang Yi-fei.

Principal characteristics of the innovative and conventional track programs

Background

The People's Republic of China has 116 medical schools. The great majority are unaffiliated with universities, and most medical programs last five years. Unlike China's much publicized innovative approaches to health care delivery, the structure of medical education is highly traditional, derived from European and North American models. Students spend three years in didactic learning of the basic sciences, one didactic/observation year in the hospital, and a final clinical year in the hospital. The connection between the basic and clinical sciences is very loose. The students have few opportunities for independent practice or community health experience.

Shanghai Second Medical University, under the jurisdiction of the municipality of Shanghai, is geared to the training of health professionals serving mainly the Shanghai area. It was founded in 1952 when there was a reorganization of institutions of higher learning throughout the country. Incorporated into the University were the Medical School of St. John's University, the Medical College of Aurora University, Tong-Teh Medical College, and the Shanghai Dentistry Special School. The University has faculties in Medicine, Pediatrics, Stomatology (Dentistry), Medical Technology, Advanced Nursing, and Biomedical Engineering. There are a variety of research institutes, including ones in Hypertension, Orthopedics and Traumatology, Gastrointestinal Disease, and Traditional Medicine. Further, there are 31 research sections focusing on such diverse areas as Acupuncture, Anesthesia, Burns, Schistosomiasis, and Family Planning. We have five affiliated teaching hospitals with a bed capacity of over 3,500. There are about 650 new students in health sciences admitted to the medical university each year, 420 of them in the M.D. Physician Program.

The innovative track

Our medical school has tested a series of experimental educational models over the past 30 years to prepare our graduates more adequately for China's future needs. None of the models has been entirely successful. We have now developed an experimental track to run in parallel with our traditional one. It is called the Clinical Problem-Oriented Basic Medical Science Curriculum (PBC), and will initially concentrate on the first two years of medical school.

The plan is broadly supported by the medical school leadership. It was designed by, and will be implemented under, the direction of the Vice President in charge of Education of the University, the Dean of Undergraduate Studies, the Chairman of the Basic Science Faculty, the Medical Education Investigation Division, and faculty members of the affected departments. The teaching faculty for the track will consist of eight basic medical science teachers and seven clinical medicine teachers. The case problems and educational exercises in the PBC program will focus on the content of eight major basic science courses: human anatomy, histology and embryology, biochemistry, physiology, microbiology (including immunology), pathology (pathologic anatomy and patho-physiology), parasitology, and pharmacology. To ensure that the students' learning is correlated with clinical reality, each course will be conducted by the respective medical science teacher in close coordination with the clinical medicine teacher.

The revised teaching program integrates three approaches: case-oriented material, lectures by teachers (with an emphasis on scientific concepts and case-problem analysis), and laboratory work. In conjunction with their classroom studies, the students will be assigned to local primary hospitals and emergency rooms for early, sustained contact with clinical medicine every one to two weeks. This active clinical participation early in the course is designed to generate student initiative and clinical awareness.

The number of students enrolled initially will be 30. Some aspects of this innovative teaching method are now being tried out in traditional classes to give students and faculty some practice. We are soliciting reaction from students, while providing teachers with first hand, preparatory course experience. Although this approach to learning is different from that of the traditional educational model, students will take the same final examinations at the end of each course as those taken by the traditional class. In addition, both

tracks will take the same comprehensive examination at the end of all basic science courses. The criteria for program evaluation of the problem-based track will be determined and developed by the University's Medical Education Investigation Division. This division includes basic and clinical science teachers, hospital attending physicians, lecturers, and associate professors. This group attended each meeting in the evolution of PBC, from the discussions of ideology to developing a comprehensive plan, from choosing the appropriate teachers to organizing the program evaluation. It is a key on-site consulting body.

Rationale, motivation, and major incentives for initiating the parallel track

Historical perspectives

In 1958 China initiated an "open door" educational reform in which learning of theory was integrated with practice, and intellectuals worked alongside workers and peasants. These changes were intended to overcome the problem of intellectual endeavor divorced from practical reality. Unfortunately, this approach in medical education too often neglected basic medical knowledge. Nevertheless, an important insight was gained from this experience — that there was great value in exposing students to clinical medicine early in their curriculum. Students were better able to correlate basic science with clinical needs.

In 1960, to meet the goals of socialist construction, means were sought to economize and modernize medical education, producing physicians more quickly. The basic innovation which was introduced was to combine courses horizontally. Nine traditional courses were combined into two large courses: 1) "Normal Human Body," which included anatomy, histology, embryology, physiology, and biochemistry; and 2) "Basic Science of Diseases," which included microbiology, parasitology, pathology, and pathophysiology. To support these new integrated courses, combined textbooks were written, integrated laboratory exercises were developed, and the total number of teaching hours were reduced. In addition, comprehensive discussions were held around clinical cases to encourage students to develop their clinical reasoning and their ability to perform more independently. "Integration" was the theme of these reforms. In addressing clinical problems in this new

curriculum, students and faculty integrated basic theory with clinical practice, normal structure and function with abnormal structure and function, curative medicine with preventive medicine, and Western medical approaches with those of traditional Chinese medicine. This experience demonstrated that integration could, technically, be accomplished, although many faculty were uncomfortable being asked to be experts in subjects not of their specialties.

In the 1970s, during the Cultural Revolution, faculties in the basic sciences were sent to rural areas, factories, and hospitals to carry out the educational reforms of that era. But again, practice was stressed to the exclusion of basic science knowledge.

These experiments through the years have shown that basic medical sciences are better appreciated when seen in their clinical context, students are able to learn sciences through the study of actual clinical problems, and students respond favorably to teaching methods that have wide variety and flexibility. In the past, when reforms were ordered by the authorities, the masses would rush head-long into pursuit of that change. Then, if difficulties arose, the entire reform would be abandoned without adequate scientific analysis. Such analysis would have determined which aspects of the reform should be retained, which should be abandoned. This is a profound lesson for China. There is great need for monitoring education and for program evaluation.

Thus, in the current PBC reform plan, the teaching methodology will be spelled out and it will be based on the best understanding of scientific learning theory. Challenges and competing ideas about the plan will be welcomed, and many approaches will be tried to allow for continual improvement.

New national call for reform

Today, support for new innovations also comes from outside the University. For there has been a decision to reform the education system by the Central Committee of the Chinese Communist Party. The Committee's goal for general reform in medical education parallels the initiative at Shanghai: to train qualified medical personnel who can meet the modern needs of China. The changes at a national level are being supported by a World Bank loan. The Ministry of Public Health has undertaken to improve the standards of health care by providing modern, scientifically-based medical education and to strengthen the training of teachers, scientists, and

administrators who will provide future leadership in medical colleges and teaching hospitals throughout China. Thus, the changes envisioned for our school, based on decades of local experimentation, also reflect newer national priorities.

Current problems to be overcome by the innovative track

A number of existing problems form the background against which the new educational approach at Shanghai has been developed. An attitude has developed at the University that is increasingly critical of the many outdated, traditional teaching methods which prevail in the conventional teaching approach. These include the following:

1. The "three foci" approach is used. This method relies solely on the teacher, the classroom, and the textbook. Here, teachers lecture and students listen. There is little emphasis on encouraging the student's initiative, imagination, or participation. Thus, many students can adapt themselves only to a passive learning role — "listen to the teacher and put it down".
2. The "stuffing" approach in teaching is commonly used — with teachers giving too many lectures, even in the laboratories, overloading students with endless, hard-to-digest facts. And there are too many required courses and credit hours, leaving little time for students to study by themselves. Thus, the students lack skills in this more responsible self-directed study approach.
3. There is a lack of integration and breadth in medical education. There exists a strong dichotomy between basic science and clinical science. Many faculty believe that a basic medical foundation should be established only by pre-clinical courses. As a result, basic science teachers often ask for too many teaching hours. And teaching of the basic medical sciences is often divorced from clinical application. Too often what was learned in basic science courses is forgotten by the clinical years.
4. Clinical courses don't challenge students to solve patient problems; the proficiency in patient history and physical examination is often neglected. Even students with high grades cannot discuss clinical problems clearly.

5. Moral guidance is often neglected by teachers. But teachers are role models, and this important function should be complementary to academic education.
6. There are no comprehensive evaluation methods to assess the quality of students' learning. The present method still relies strictly on grades obtained from written examinations.

How the track was initiated and organized at the outset

The Chinese government has clearly indicated that universities have the right to design and revise their own teaching plans in accord with a national effort to expand the autonomy of higher education. Thus, PBC did not have to be reviewed by the government prior to inception. Once the university president approved the plan, it could begin.

The new curriculum will significantly increase the time for self-directed study and discussion. It de-emphasizes the "stuffing" approach, and changes the emphasis from "teaching" to "learning". The teacher's role is primarily that of a guide, who is expected to initiate discussion and inspire students' interest in learning. Given the limitations of existing resources and allowing for an initial gestation period for both teachers and students, the experimental class, while learning in a very different way, will initially use the same course sequence and take the same examinations as students in the traditional track. The purpose of this approach is to introduce the reform one step at a time. Each department will implement the revision in accordance with its own existing conditions. Some faculty will teach in both tracks, while some will teach exclusively in the new track.

PBC is the result of ongoing intensive discussions with the involved departments, with the intent of refining the plan, as well as of gaining staff support. The teaching plan in each course is fully discussed with the affected department. There is usually much debate as to how time should be distributed between small group discussions, lectures, and laboratories. While the department makes suggestions to the PBC planning group, it doesn't control that group. The PBC planning group maintains control of the idea and of its consistent expression through all the courses.

No special funding was applied for. Financial support for the track simply came from the University's annual budget, which in

turn, comes from the Shanghai Municipality Higher Education Fund.

At first, students will be enrolled into the experimental class on a strictly voluntary basis. For the purposes of comparing the results of each track, some teachers recommended using a randomized selection procedure. Although we are carrying out preparation for that possibility, the program will still incorporate some form of voluntary enrollment. The class of 30 will be broken into two to four smaller groups, depending on tutor preference.

Following is an example of how one course, physiology, has been adapted to the principles and needs of the experimental track.

Physiology

I. Sample content and hours

Content	*Hours*	*Time allotment*		
		L	D	S
Introduction	2			2
Basic cellular function	8	2	2	4
Circulation	22	6	6	10
Respiration	9	3	2	4
Digestion and absorption	10	3	2	5

L: Lecture; D: Class discussion; S: Self-directed study

II. Teaching methods

The basic idea is to encourage students increasingly to study scientifically by themselves using selected clinical problems. Classes are held in the form of discussions, lectures on special topics, and laboratory exercises. When some key concepts are particularly difficult to grasp or visualize, e.g., the organization of the nervous system, the faculty might present orienting lectures in the classroom.

III. Sample clinical problem in cardiovascular physiology

Case	A female, 29 years old
Complaint	Palpitation, shortness of breath on exertion, and orthopnea during the night for one month.
Physical examination:	Slight cyanosis of the lips, and a pitting edema of the lower extremities. H.R. 100/min. A harsh, Grade III

	diastolic murmur and a grade III systolic murmur were heard at the apex and the tricuspid area respectively.
Chest X-ray	Enlargement of the left atrium and the right ventricle.
E.C.G.	Sinus rhythm and right ventricular hypertrophy with S-T, T changes.
Clinical diagnosis	Mitral stenosis with secondary pulmonary hypertension and right heart failure.

Sample comprehensive questions:

1. Why did the patient with heart disease have dyspnea?
2. What factors influence the pumping function of the heart? What are the hemodynamic consequences of pulmonary hypertension?
3. How are heart murmurs produced? What organic changes or functional disorders of the heart can be revealed by the murmurs?
4. Why does the heart rate increase during greater physical or emotional activity, and decrease during rest?
5. Why does edema of the lower extremities occur during the right heart failure? Can you give a logical explanation for it?

The comprehensive questions following each case have been chosen within the field of physiology, and care has been taken to avoid topics mainly concerning other disciplines. This allows the students to concentrate on key concepts in physiology.

The program is being implemented in two stages. First, starting in 1985, there has been experimentation in eight basic, and some clinical, courses to give planners practical experience with the method. For example, this year, case problems were developed which focused on diverse areas, such as cancer of the stomach, cerebrovascular diseases, and various disturbances in the abdomen. Students and faculty gave positive feedback on the exercises, agreeing that the exercise integrated basic and clinical sciences and encouraged students' self-directed study. Some of the exercises were videotaped and shown to larger audiences—thus increasing the interest of students and teachers. Second, in the second semester of the 1986-87 academic year, 30 volunteers from the first-year class will be accepted into the first class of the experimental track. We will review their first semester performance as well as high school grades and recommendations, before selection.

Forces resisting change

Despite the national mandate to begin educational reform, and the blessing and encouragement by local leaders to attempt change at the Shanghai Second Medical University, there is considerable concern and resistance to the attempted changes. These changes have been implemented primarily in Western countries but have never been fully tested in China, a country very different in terms of its history, culture, and available resources. Following are the key controversies over the establishment of our problem-oriented, basic medical science curriculum:

1. Appreciating the damage already caused by "extreme leftist policies" in the past, teachers are afraid that the new curriculum may cause further conflict. The pendulum of change, at times, has had severe consequences for those who stood out by embracing new ideas. Though the new changes may seem logical, the past risks inherent in change leave many faculty worried about personal commitment to such a drastic reform.
2. Present practising medical professionals, all trained by the traditional model, question whether curricular change is really necessary. Further, the teacher in China has had a very revered, authoritative role since the time of Confucius. Thus, the new teaching technique is perceived as a threat to this relationship that has existed for thousands of years. Having one's role converted from a venerated wise man to that of a "facilitator" may indeed be an uncomfortable prospect.
3. Teachers fear that the necessary adaptive changes would be too time-consuming, and that this might hinder their research work, thus reflecting unfavorably on prospects for promotion. This concern is heightened by the fact that class sizes and teaching burdens in China are quite large compared to those in Western medical schools.
4. Teachers from both the basic science and clinical sectors fear that the merger of many courses may augur the dissolution of their specialities.
5. A mis-translation of the term "Primary Care Curriculum" used by the New Mexico program which was so instrumental in our development, has led to the impression that this new curriculum is mainly for training junior medical personnel.

This was especially ironic because one of the goals is to produce graduates better prepared for faculty and hospital leadership roles.

There are also practical realities which create stress on the University's manpower, regardless of the nature of the reform plan. First, there is a large teaching responsibility. Second, the affiliated teaching hospitals have a very heavy clinical load — a total of 3,500 beds with 4,800,000 outpatient and emergency visits per year. Third, the University's funds and basic facilities have not been able adequately to meet the educational and service demands placed upon it.

However, there is hope on the horizon. In the past five years, funds for Shanghai's institutions of higher learning have increased 12.6% per year — the fastest rate of increase since Liberation in 1949.

Strategies developed to overcome barriers to change and to develop support forces

The key strategy for building support and overcoming resistance has been extensive discussions and debate on the importance and urgency of reform. The President of the University addressed the Committee of University Affairs and held conferences with faculty groups and repeatedly stressed the importance of reform. The Educational Labor Union mobilized teachers' enthusiasm for the reforms, and they invited educational experts to come to the medical school to discuss new trends in education. In these ways, a general consensus is being built to support the new track. And there is strong agreement, from both teachers and students, that our educational model should be revised away from too many lectures, too much passive learning, too much rote memorization.

The administration has also employed other strategies to build support. It mandated that change toward a small-group, problem-based format must take place, but it encouraged ownership of that change by the different basic science departments by allowing them to recommend their own curricular reform plans to the PBC planning group. In addition, many small experiments were encouraged to allow the faculty to be convinced by their own experience, rather than just by theory, prior to accepting the first class into the new track. Such local experimentation also involved clinical-year students. For example, for the past two years Dr. Tsai

Yen, Chairman of Neurology, reformed his entire curriculum to utilize case histories and be problem-based. This idea has now spread to other clinical disciplines, such as internal medicine.

To stress the great value that the administration places on educational reform, it was declared that participation in, and results from, attempts at reform would be a factor in evaluation of teacher performance and in promotion considerations. The educational administrative department designed detailed procedures to evaluate teachers in terms of their efforts in the reform, and information about this new approach was printed in the University periodical.

Finally, it is important to note that faculty and students in the experimental track were recruited on a voluntary basis. Many past reforms that failed were instituted under compulsion. This mistake will not be repeated here.

The role of other institutions in helping to develop a parallel innovative track

Since 1983, the University has exchanged ideas about educational reform with other medical schools in China. For instance, Chongshan Medical College shared their experience in instituting an experimental class in which students study primarily on their own. The degree to which this approach seemed to stimulate their initiative to learn was very impressive. In 1984, Dr. Kaufman, from the University of New Mexico, visited Shanghai University and introduced the Primary Care Curriculum to a group of our basic and clinical scientists interested in reform. He presented the program in a series of lecture/discussions, then conducted a series of workshops on problem-based learning. The medical students worked with case problems in tutorial groups as our faculty observed, tutored, and asked many probing questions. Dr. Kaufman then demonstrated a new evaluation system that addressed not just one, but many aspects of the students' performance. The New Mexico approach to medical education had many appealing features for PBC because it reinforced what had seemed successful in the past, and made reform seem more tangible and achievable. The approach stressed self-directed study, it integrated basic and clinical sciences, and it offered a strategy for change by using an experimental track. This use of an experimental track seemed an easier way to test a new idea, because it was less threatening to a more traditional faculty than seeking

total curricular change, untested, all at once. Further, PBC would focus only on basic sciences at first, without demanding major changes in the large hospital services.

The New Mexico experience was of such interest that in 1985, the Vice President of Shanghai University visited the New Mexico program. He participated in tutorials, and spoke extensively with students and faculty in the program, thus gaining a greater understanding about this approach to learning. It was clear that students learning in a small-group, problem-based environment were strongly motivated to learn basic and clinical sciences, and could do much of it independently. The visit convinced the Vice President to plan Shanghai Second Medical University's Clinical Problem-Oriented Basic Medical Science Curriculum. Since that time, the New Mexico program has sent us curriculum materials, text books, and teaching plans. Most of these have now been translated into Chinese, and have been utilized extensively.

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For a long time, the major emphasis of many programmes concerned with the education and training of health personnel has been on an increase in quantity. Although this drive for quantity has been successful, and in some cases even too successful leading to overproduction of certain categories of health personnel, the relevance of the trained personnel to the health needs and demands of the population has often been far from satisfactory.

There are a few new training institutions where there is a clearly demonstrated concern with the relevance of the training programme, and where it is well understood that "one is excellent only if one is relevant" and that "the highest standard in medical education for any country is that which is most responsive to local need". Established institutions with conventional training programmes seem to find it difficult to move away from the well-known hospital-based, exclusively patient-oriented pattern. The notable exceptions are those institutions, a mere handful, that decided to allow the development of an additional, alternative programme. These "innovative tracks" often serve as a community-oriented "option" within the framework of an otherwise traditional institution. These "tracks" thus represent the hope for change for these older, established institutions in the direction of relevance to the WHO goal of health for all by the year 2000.

The object of this book, which summarizes the discussions at a meeting held in Albuquerque, New Mexico, in October 1986, is to make these "innovative tracks" programmes, and the valuable experiences of those who have developed them, widely known to help others who want to change to get started, avoid pitfalls, and proceed more rapidly.

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